INCLUsive Disaster Education

(INCLUDE)

Output 1 – Final Report

University of Huddersfield

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University of Huddersfield
University of Central Lancashire
Keio University
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List of Abbreviations

HUD = University of Huddersfield

KEIO = Keio University

LU = Lund University

UCLAN = University of Central Lancashire

VGTU = Vilniaus Gedimino technikos universitetas

1. Introduction

INCLUDE (INCLUsive Disaster Education) is a collaborative research project co-funded by EU Erasmus+ programme. This two-year research initiative aims to reimagine online distance learning education so that it better supports the diverse DRR community. The project aims to reimagine online distance learning education so that it better supports the diverse DRR community and the following objectives have been set out:

- To understand online, distance learning strategies currently used in DRR education and their effectiveness, by taking into consideration in promoting gender equality and sensitivity and also in addressing differences in relation to the access and use by underrepresented groups.
- To develop a framework to reimagine online distance learning education so that it better supports the diverse DRR community, also in addressing both natural and biological hazards and their integration
- To design an innovative University-Industry digital learning platform to provide high quality inclusive digital education to DRR community
- To explore the opportunities of the use of disruptive technologies in online distance learning education in DRR
- To propose a digital competence framework for educators in building capacity to implement online and distance teaching and learning in DRR

INCLUDE project is led by the University of Huddersfield's Global Disaster Resilience Centre, based in the UK. The project consortium also consists of the following partners:

- University of Central Lancashire, UK
- Lund University, Sweden
- Vilnius Gediminas Technical University, Lithuania
- Keio University, Japan

This report is dedicated for the Output 1 of the INCLUDE project which aims at Identifying current practices associated with online Disaster Risk Reduction (DRR) education, their effectiveness and the main challenges faced in the field of online DRR education. The methodology of the output was such that it was two-fold where both the learners' and educators' perspectives were evaluated. As the first stage the partners conducted an online survey to gather data on the perspective of learners in terms of the online DRR education. Next, expert interviews were conducted by the partners to cover the educators' perspective in this regard. This report is mainly divided into two parts as per the perspectives of learners' and educators'.

2. The learners' perspective – the Survey component

This section presents the learners' perspective that was covered through the online survey. The section will first of all present the general information of the sample that participated in the survey following which a discussion on the online, distance learning/teaching strategies used in DRR education (State of art digital disaster education) and impact of student-specific challenges/difficulties for online and distance DRR education will take place.

2.1 Background to the survey

The survey for the output 1 was conducted by all the partners using two separate online survey platforms. The UK and the Europe partners conducted the survey on Survey Monkey and the target samples were from their own institutes and the country context (for the ones who had no specific DRR taught course in their respective institutes). The Japan partner conducted survey on Google forms covering the context of the Asia pacific (India, Sri Lanka, Bangladesh, Pakistan, Philippines, Nepal, and Japan). The final count of the survey responses can be summarised as follows:

1. *United Kingdom - 43*
2. *Sweden - 17*
3. *Lithuania – 15*
4. *Asia Pacific – 66*

Overall total – 141

Hence, this section will present the general background of the respondents based on their respective country/regional contexts.

2.1.1 The Asia Pacific Context[1]

2.1.1.1 Approach

We conducted a purposive sampling where institutions with DRR courses were first identified across the Asia Pacific. Secondly, we searched for a gatekeeper in the form of a Lecturer/Professor to relay the questionnaire to students of the courses.

[1] The authors would like to acknowledge team Keio for sharing a comprehensive report on the online survey conducted by them and this section is a direct extraction of the said report.

2.1.1.2. Preliminary Analysis of Survey Results

- Survey created on 08/26/2022
- Results extracted on 11/08/2022
- Total Respondents – 67

2.1.1.3. Characteristics of Participating Universities

After the process of identifying the potential target universities, there were about thirteen universities in about eight countries. The figure below shows the percentage of responses from each institution. However, the highest number came BRAC University in Bangladesh with 19% of respondents, the University of Colombo, Sri Lanka 18%, and the University of Peshawar, Pakistan 18%. Of all respondents, nearly 80% are aged 30 years and below with an average age of 28% (s.d. 5.2)

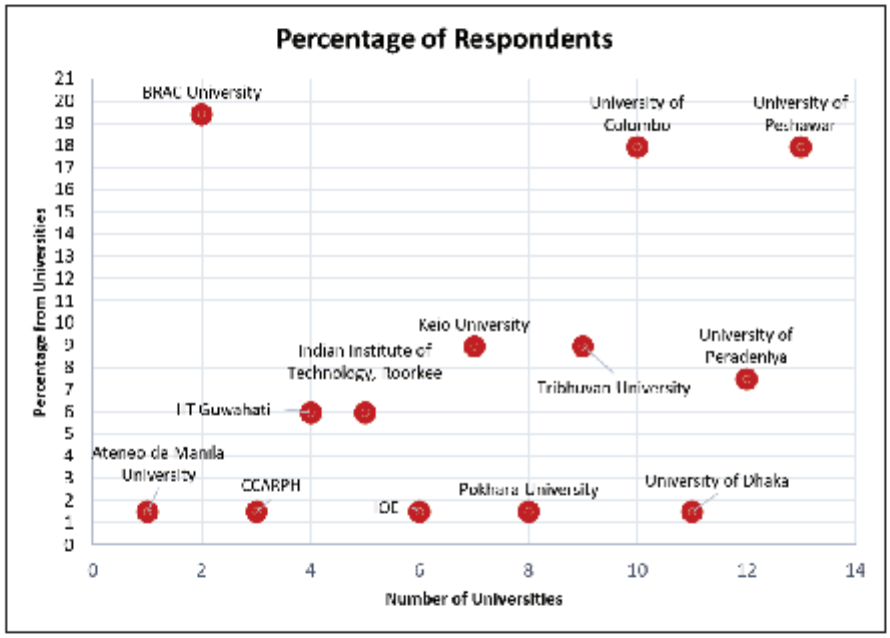

Figure 2.1: Participated Universities – Asia Pacific

The following graphs are extracts from the characteristics of respondents

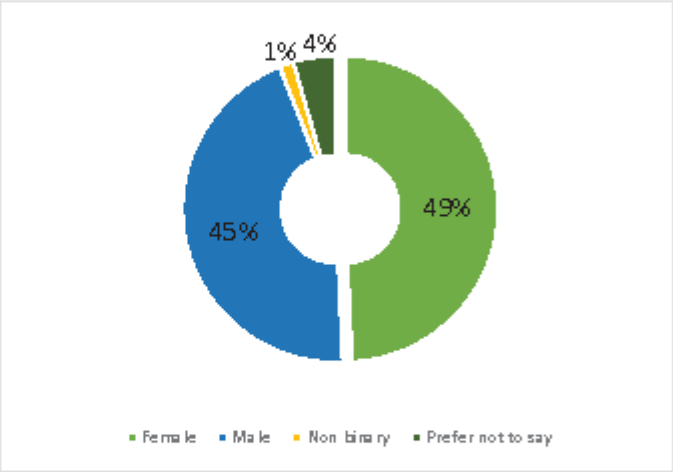

Figure 2.11: Gender of Participants – Asia Pacific

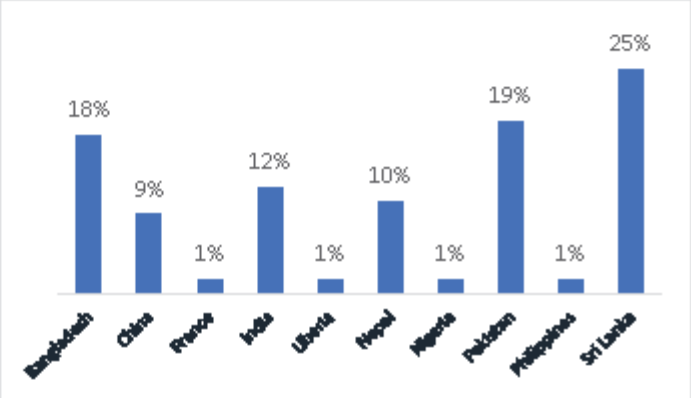

Figure 2. 12: Country of Origin – Asia Pacific

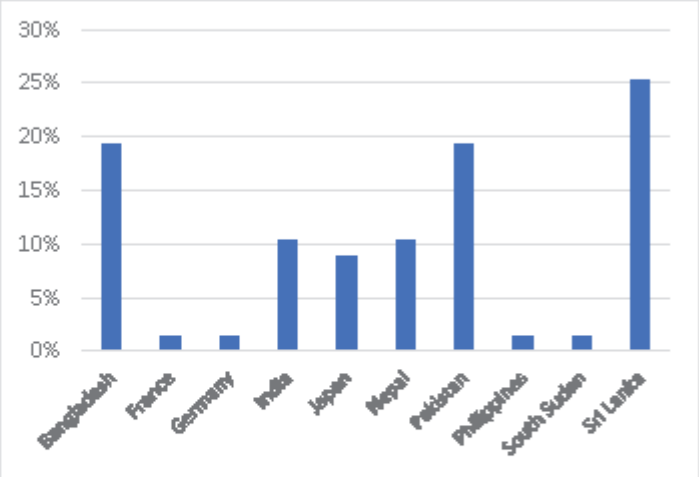

Figure 2.13: Country of Residence – Asia Pacific

	Country of Origin										
Country of Residence	Bangladesh	China	France	India	Liberia	Nepal	Nigeria	Pakistan	Philippines	Sri Lanka	**Total**
Bangladesh	11	0	0	0	1	0	1	0	0	0	13
France	0	0	1	0	0	0	0	0	0	0	1
Germany	0	0	0	1	0	0	0	0	0	0	1
India	0	0	0	7	0	0	0	0	0	0	7
Japan	0	6	0	0	0	0	0	0	0	0	6
Nepal	0	0	0	0	0	7	0	0	0	0	7
Pakistan	0	0	0	0	0	0	0	13	0	0	13
Philippines	0	0	0	0	0	0	0	0	1	0	1
South Sudan	1	0	0	0	0	0	0	0	0	0	1
Sri Lanka	0	0	0	0	0	0	0	0	0	17	17
Total	**12**	**6**	**1**	**8**	**1**	**7**	**1**	**13**	**1**	**17**	**67**

	Studying in home country
	Studying in outside home country

Figure 2.14: Country of Residence by Country of Origin – Asia Pacific

Figure 2.14 shows the relationship between the country of origin and the country of residence. The

	Country of Origin										
Country of Residence	Bangladesh	China	France	India	Liberia	Nepal	Nigeria	Pakistan	Philippines	Sri Lanka	**Total**
Bangladesh	11	0	0	0	1	0	1	0	0	0	13
France	0	0	1	0	0	0	0	0	0	0	1
Germany	0	0	0	1	0	0	0	0	0	0	1
India	0	0	0	7	0	0	0	0	0	0	7
Japan	0	6	0	0	0	0	0	0	0	0	6
Nepal	0	0	0	0	0	7	0	0	0	0	7
Pakistan	0	0	0	0	0	0	0	13	0	0	13
Philippines	0	0	0	0	0	0	0	0	1	0	1
South Sudan	1	0	0	0	0	0	0	0	0	0	1
Sri Lanka	0	0	0	0	0	0	0	0	0	17	17
Total	**12**	**6**	**1**	**8**	**1**	**7**	**1**	**13**	**1**	**17**	**67**

shaded blue shows where the country of origin is the same as the country of residence. The green however shows students living in countries other than their country of origin

2.1.1.4. Qualifications of the Participants

This part gives information on the educational background and other study characteristics

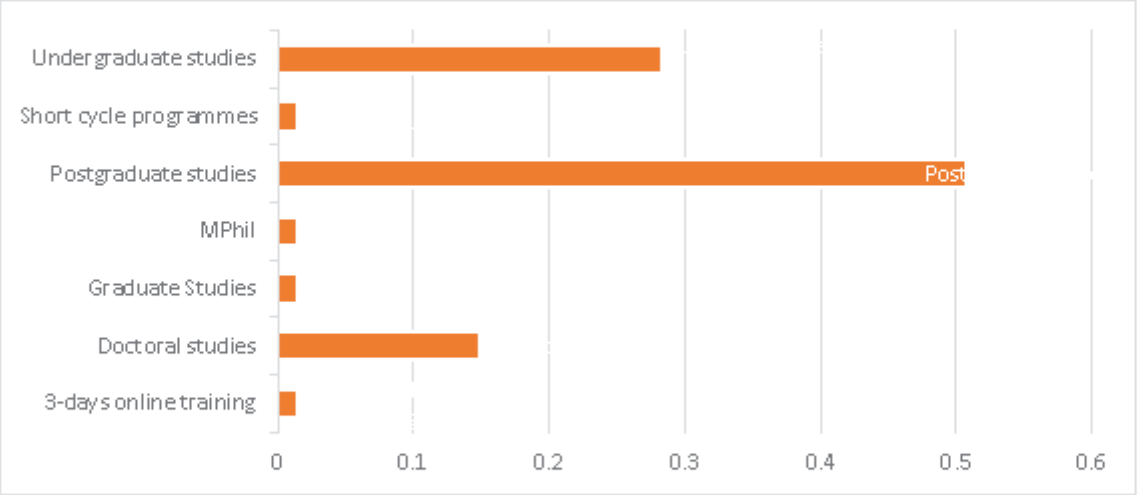

Figure 2.15: Qualification of Participants - Asia Pacific

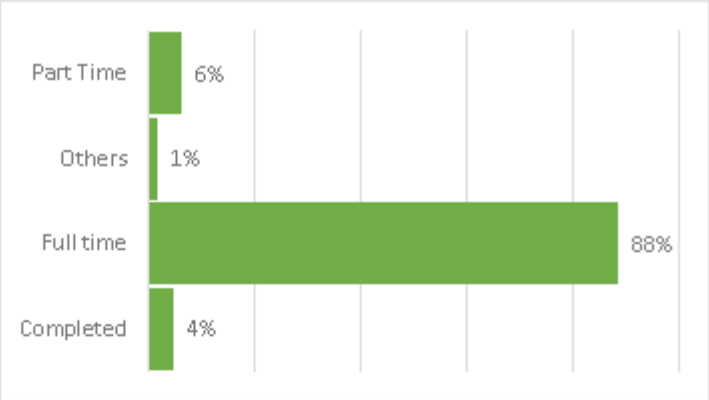

Figure 2. 16: Status of Participants - Asia Pacific

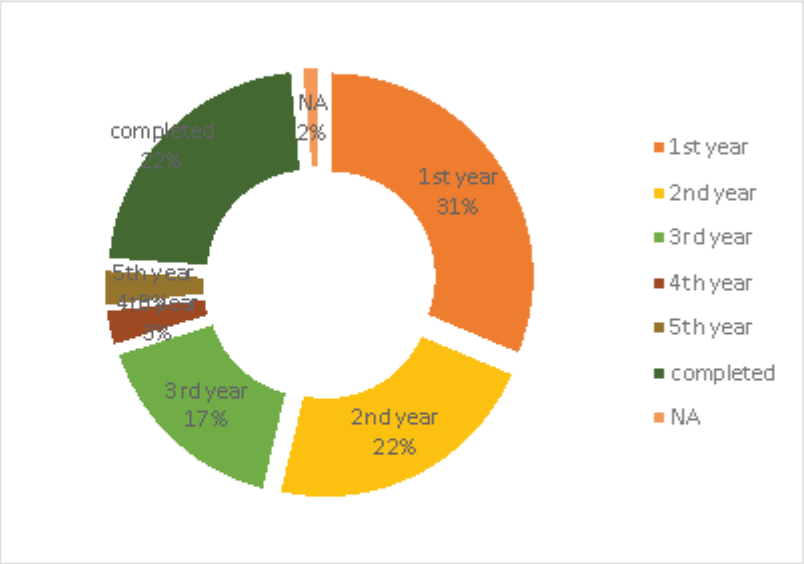

Figure 2.17: Current Year of Study - Asia Pacific

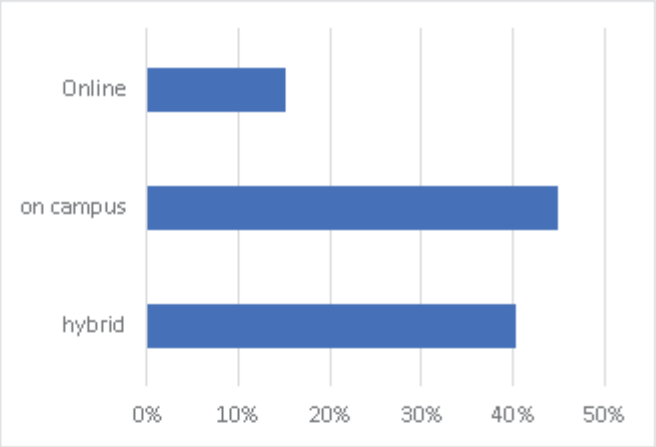

Figure 2.18: Mode of Study - Asia Pacific

		StudyMode			
Student Status		Hybrid	On Campus	Online	Total
Completed	Count	0	1	2	3
	% within Completed Students	0.00%	33.30%	66.70%	100.00%
	% within StudyMode	0.00%	3.30%	20.00%	4.50%
Full time	Count	26	27	6	59
	% within Full Time Students	44.10%	45.80%	10.20%	100.00%
	% within StudyMode	96.30%	90.00%	60.00%	88.10%
Others	Count	0	0	1	1
	% within Other Students	0.00%	0.00%	100.00%	100.00%
	% within StudyMode	0.00%	0.00%	10.00%	1.50%
Part Time	Count	1	2	1	4
	% within Part Time Students	25.00%	50.00%	25.00%	100.00%
	% within StudyMode	3.70%	6.70%	10.00%	6.00%
Total	All Students	27	30	10	67
	% Total of All Students	40.30%	44.80%	14.90%	100.00%
	% Total of All Students Study Mode	100.00%	100.00%	100.00%	100.00%

Figure 2. 19: Relationship between Student Status and their Modes of Study - Asia Pacific

Of the 88% that undertake full-time studies, Figure 2. **19** shows that only a few take exclusive online classes. They are rather split between taking classes on campus or hybrid format.

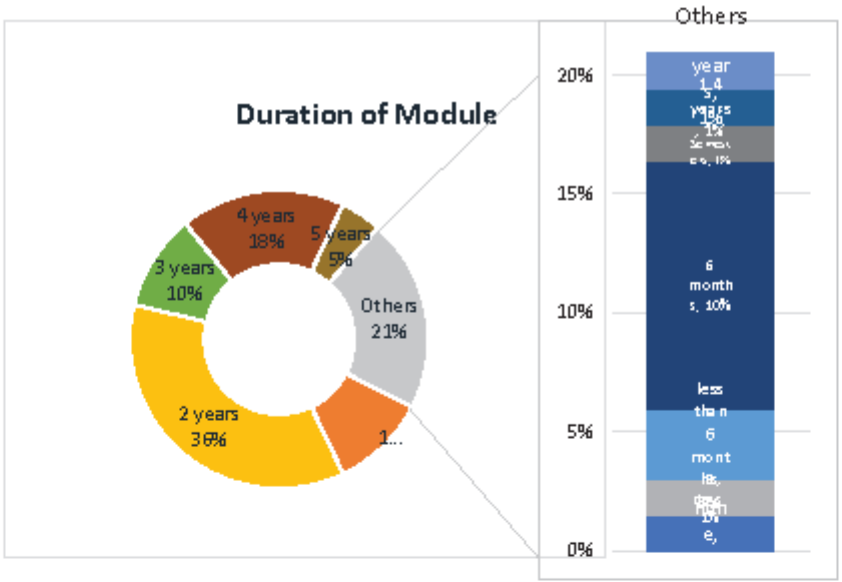

Figure 2. 20: Duration of Study - Asia Pacific

2.1.2. The United Kingdom

2.1.2.1. Approach and Survey Results

The survey proportion of the Output 1 of the UK context was conducted via the online survey platform SurveyMonkey. The survey was conducted utilising a purposive sample where the targeted respondents were identified based on the UK country context. The initial recognised target groups were as follows:

1. Doctoral researchers attached to the Global Disaster Resilient Centre, University of Huddersfield

2. Undergraduate and postgraduate students following courses relevant to Disaster Risk Reduction in the University of Huddersfield
3. Undergraduate and postgraduate students following courses relevant to Disaster Risk Reduction in the University of Central Lancashire

Further, the sample was extended to the context of the inclusive digital disaster education at the tertiary level in the UK. This included digital disaster education offered through;

- Short cycle programmes
- Undergraduate studies
- Postgraduate studies
- Doctoral studies
- Professional education/ training (including 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 said targeted respondents were approached through the relevant Lecturers/Professors to share the questionnaire among their students of the courses.

- Total Respondents – 43

2.1.2.2. Demographic information of the respondents

The demographic details covered by the questionnaire is the gender of the respondents and their ethnicities. The following figures of 1 and 2 depicts the summary of the gender and the ethnic profiles of the respondents.

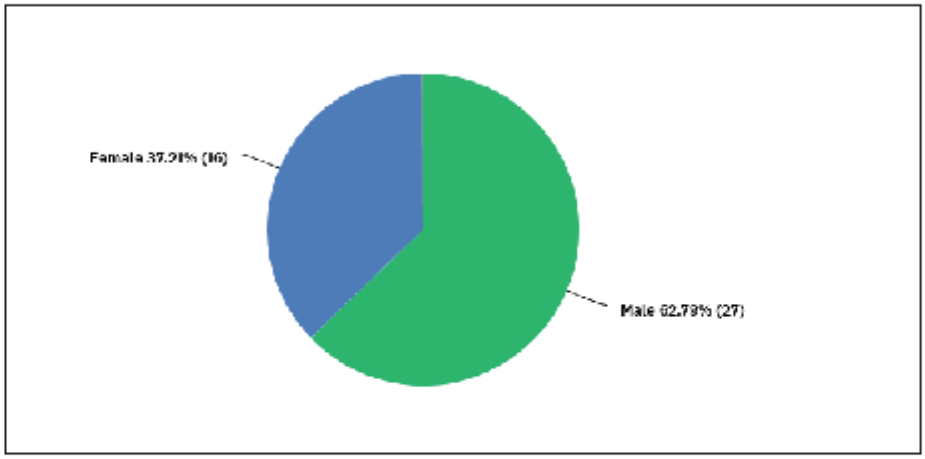

Figure 2.12: Gender of the respondents – the UK

As per the above Figure 1, the majority of respondents (63%) were male. However, it is notable that there is not much of a significant difference between male and female as it has been recorded that 37% of the respondents were female. However, the sample does not represent students who are non-binary or the ones who prefer not to reveal their gender.

On the other hand, in terms of the ethnicity of the respondents, majority of the respondents (37%) belong to the categories of Asians (that represents country contexts of Indian, Japanese, Sri Lankan, Other) and white.

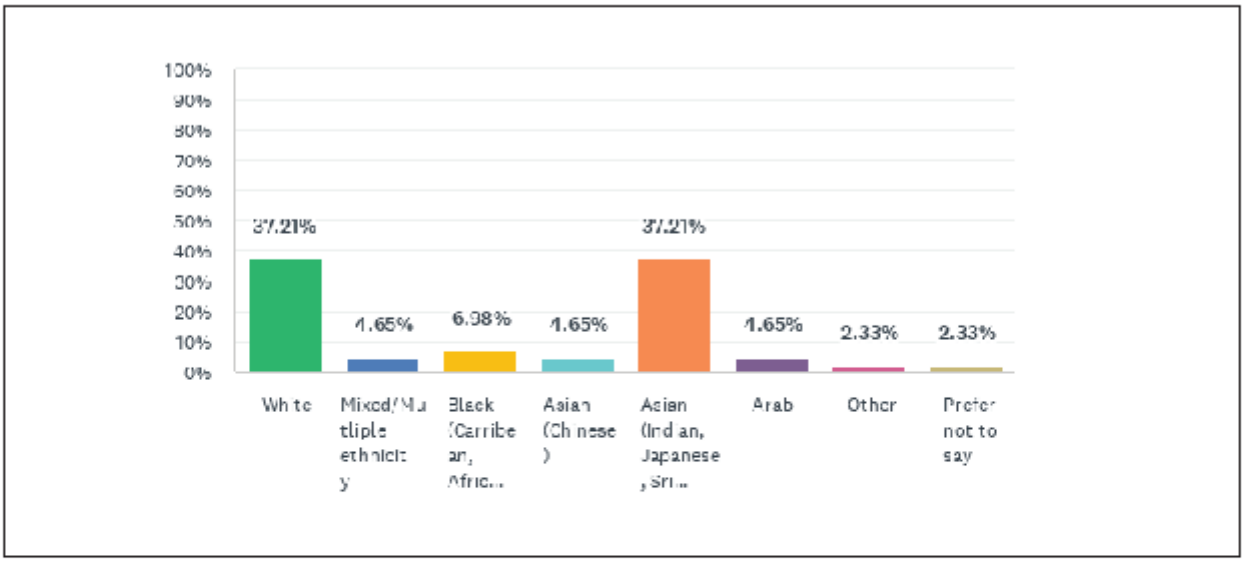

Figure 2.13: Ethnicity of the respondents – the UK

2.1.2.3. DRR course the respondents have enrolled in

The DRR courses the respondents have been enrolled into revealed a broader variety of subjects matters that is directly linked to the context of DRR. Main themes that was derived from the courses that were mentioned by the respondents are:

- Disaster management
- Disaster planning
- DRR
- Disaster Risk Management
- Climate Change and Food Security Sector
- Emergency Planning
- Risk, Crisis and Disaster Management
- Disaster resilience in Smart Cities
- Early Warning and Agriculture
- Disaster Resilience
- Pandemic Preparedness and Community Participation
- Disaster justice
- Health hazards in road construction
- Emergency Management
- Fire safety and risk management

The above recognized themes depict a wider context of the concept of DRR and it shows how various courses contribute towards exploring several related aspects of DRR. When the duration of these courses was inquired the majority (33%) of the said courses ran in a span of four years.

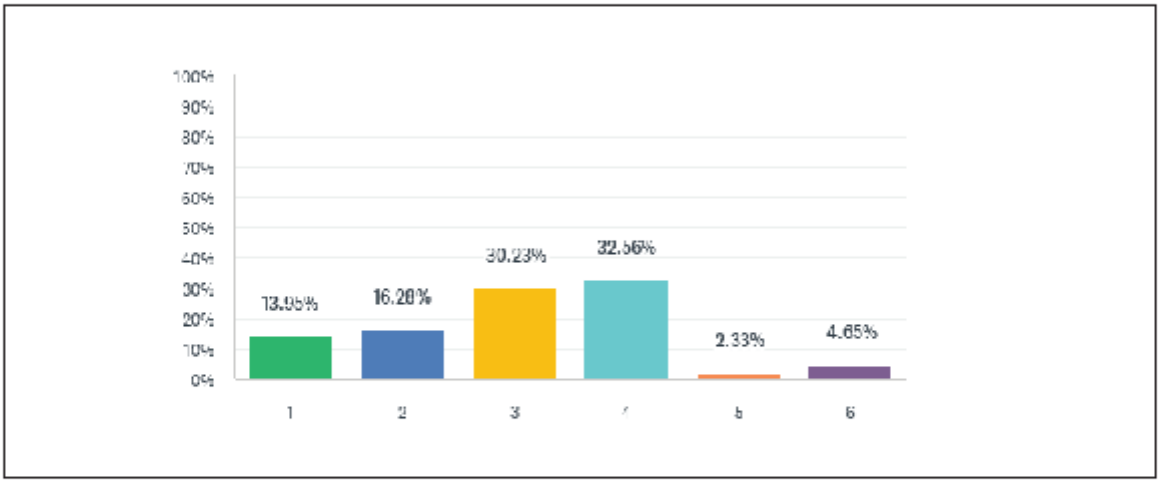

Figure 2.14: Duration of the DRR courses – the UK

2.1.2.4. The qualification the respondents have/has enrolled in

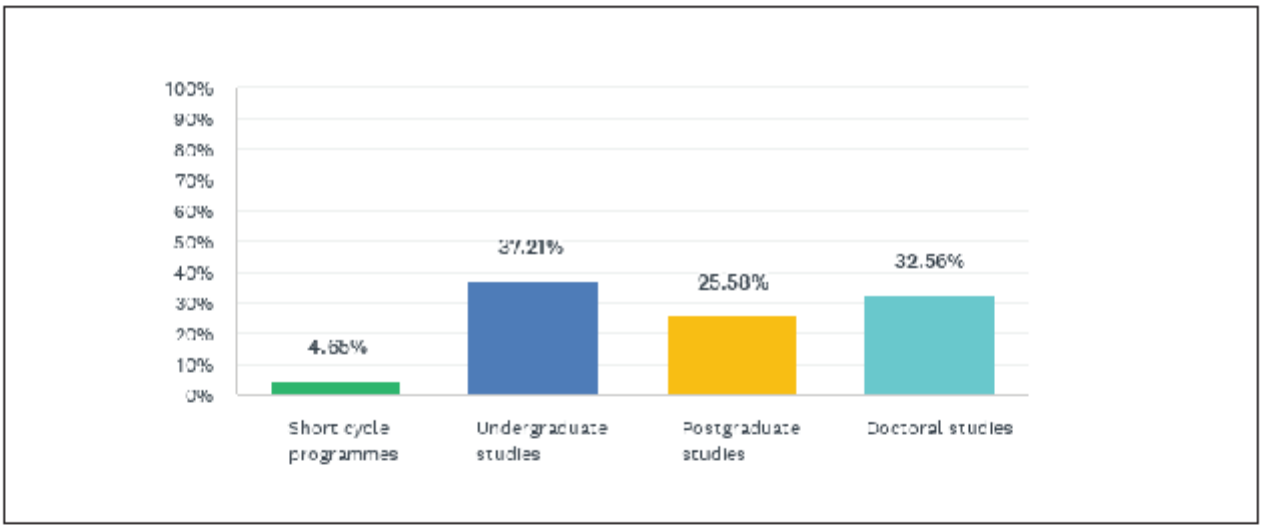

Figure 2.15: Level of qualification of the respondents – the UK

It is notable that the majority (37%) of the respondents are following undergraduate studies. The sample also has 33% of students who are following doctoral studies.

With majority of respondents being doctor of philosophy candidates and undergraduates, the majority of 33% are in their 3rd year. It is also notable that 9% of them have already completed their courses/programmes.

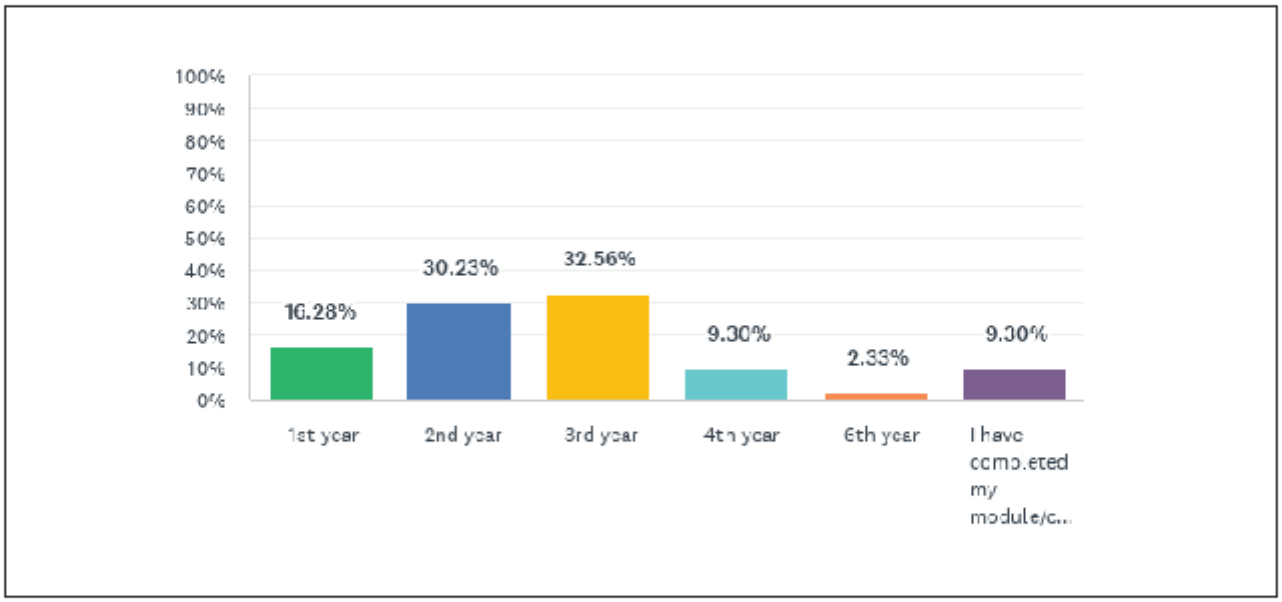

Figure 2.16: The year respondents are currently studying in – the UK

As per the Figure 6, the majority (63%) of the respondents are full time students. However, it is a point to be noted that there is considerably low margin of 26% difference between the full time and part-time students in the selected sample.

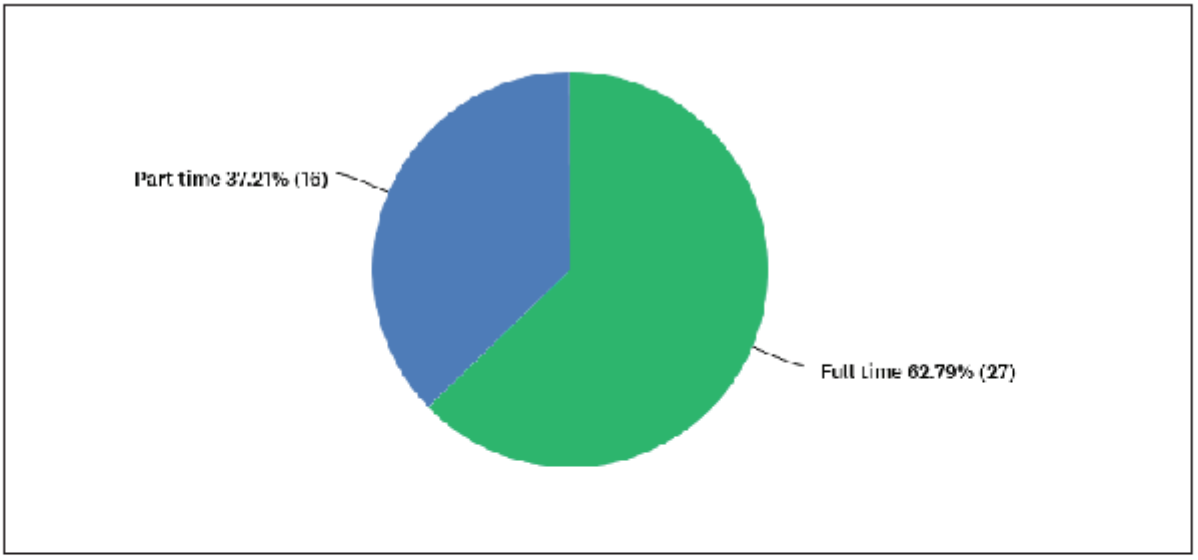

Figure 2.17: Full-time or part time studentship – the UK

In terms of the modality of the course, while majority follow it on campus, there is a considerable amount that follows the course in the hybrid mode.

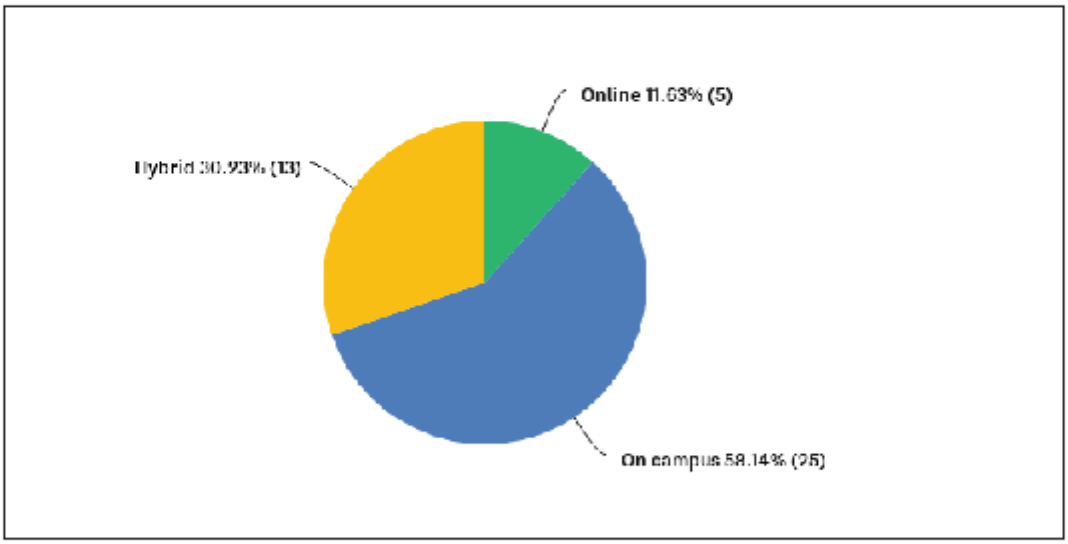

Figure 2.18: Mode of study – the UK

Out of the total respondents, all of them were residing in the United Kingdom except for three respondents who are following the course from Sri Lanka.

2.1.3. Sweden

2.1.3.1. Approach and Survey Results

The survey proportion of the Output 1 of the Sweden was conducted via the online survey platform SurveyMonkey. The survey was conducted utilising a purposive sample where the targeted respondents were identified based on the Sweden country context. The initial recognised target groups were undergraduate and postgraduate students following courses relevant to Disaster Risk Reduction in the Lund University.

The said targeted respondents were approached through the relevant Lecturers/Professors to share the questionnaire among their students of the courses.

- Total Respondents – 17

2.1.3.2. Demographic information of the respondents

The demographic details covered by the questionnaire is the gender of the respondents and their ethnicities. The following figures of 1 and 2 depicts the summary of the gender and the ethnic profiles of the respondents.

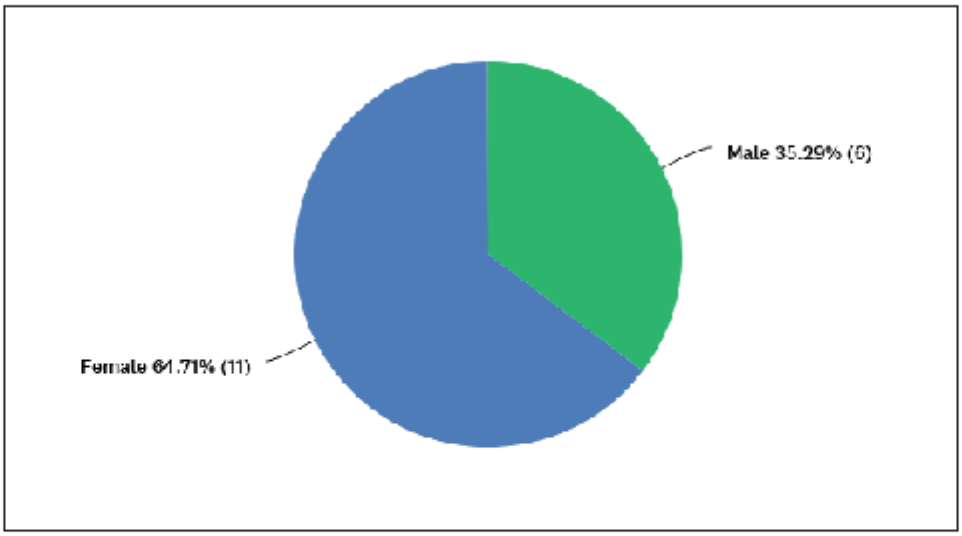

Figure 2.19: Gender of the respondents - Sweden

As per the above Figure 1, the majority of respondents (65%) were females. There is a notable difference between male and female as it has been recorded that only 36% of the respondents were female. However, the sample does not represent students who are non-binary or the ones who prefer not to reveal their gender.

On the other hand, in terms of the ethnicity of the respondents, the following figure depicts that the respondent sample does not cover a wide variety of ethnicities. More than half of the respondents (94%) belong to the category of White. Only one respondent was Asian that represents country contexts of Indian, Japanese, Sri Lankan, Other with a percentage of 6%.

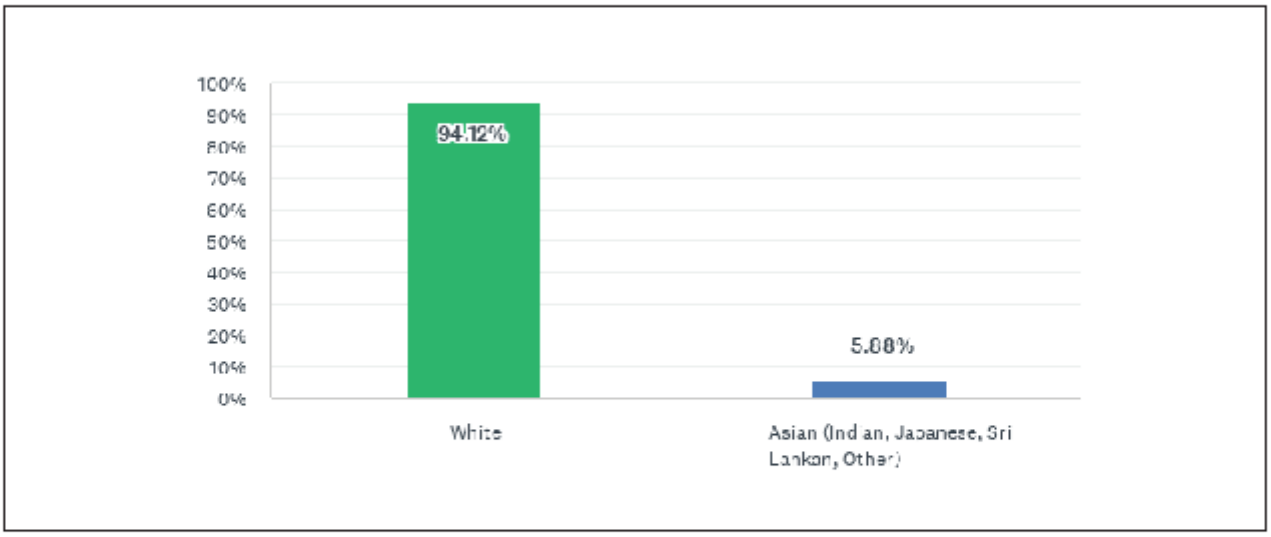

Figure 2.20: Ethnicity of the respondents – Sweden

2.1.3.3. DRR course the respondents have enrolled in

The DRR courses the respondents have been enrolled into revealed a broader variety of subjects matters that is directly linked to the context of DRR. Main themes that was derived from the courses that were mentioned by the respondents are:

- Climate Change Adaptation
- Capacity Development
- Fire safety
- Disaster Risk Reduction
- Societal Resilience

The above recognized themes depict a wider context of the concept of DRR and it shows how various courses contribute towards exploring several related aspects of DRR. When the duration of these courses was inquired the majority (82%) of the said courses ran for two years.

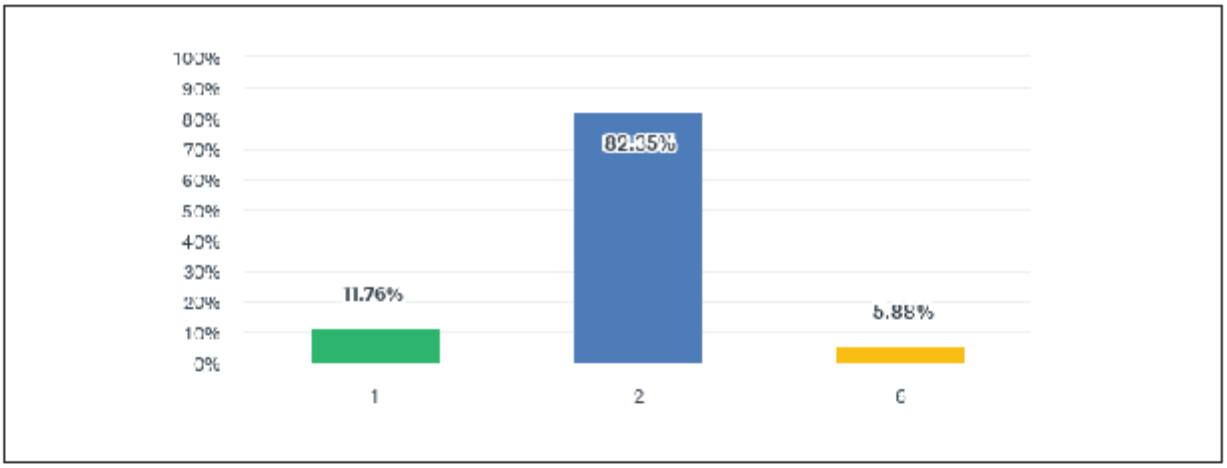

Figure 2.21: Duration of the DRR courses - Sweden

2.1.3.4. The qualification the respondents have/had enrolled in

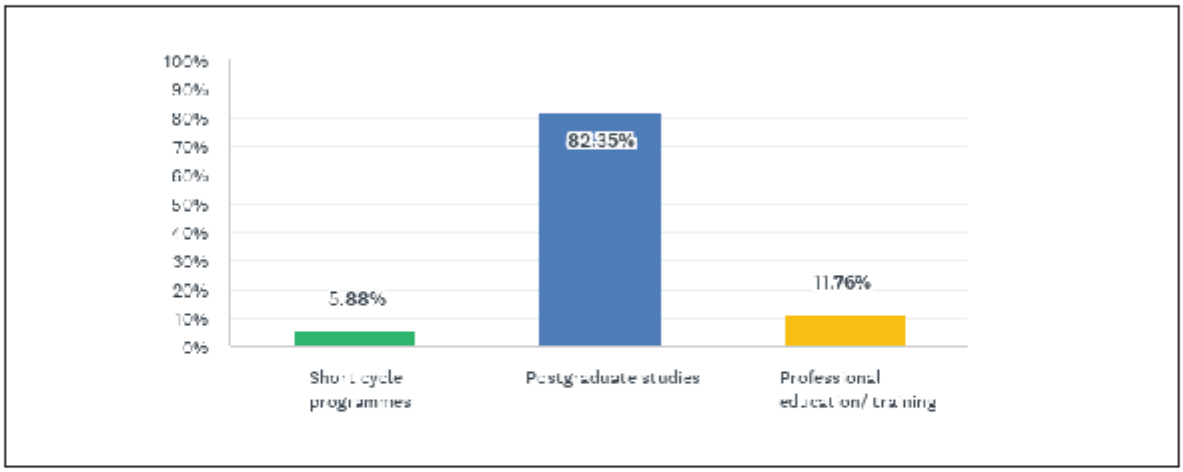

Figure 2.22: Level of qualification of the respondents - Sweden

It is notable that the majority (82%) of the respondents are following postgraduate studies. The sample also represents 12% of professional education/training and 6% of short cycle programmes. However, the sample does not cover respondents who are undergraduates or who follow doctoral programmes.

With majority of respondents being undergraduates, the majority of seven (41%) have already completed their courses/programmes. It is also notable that 29% of them are still in the first year.

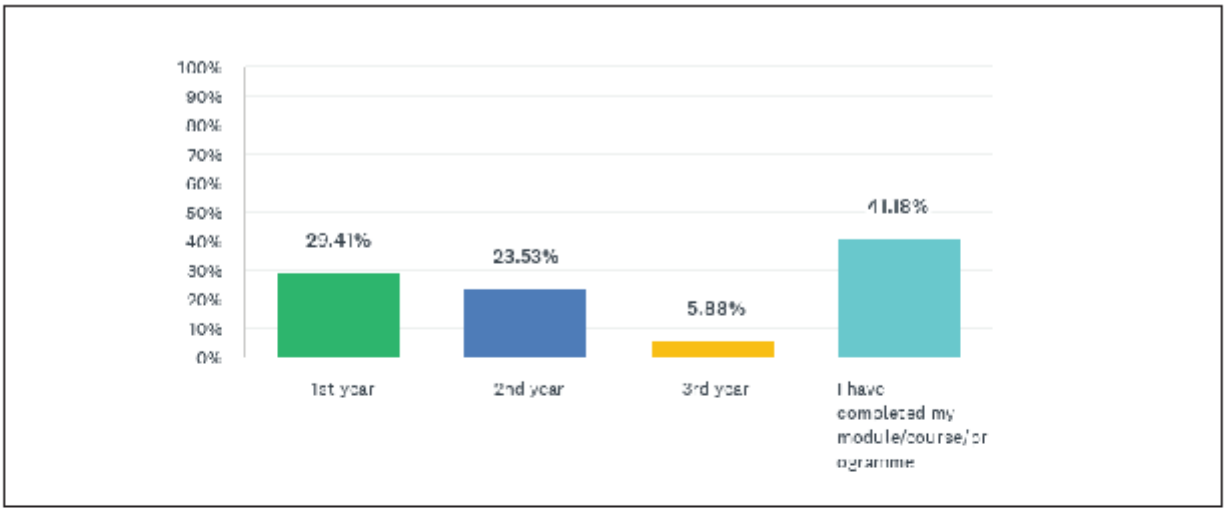

Figure 2.23: The year respondents are currently studying in - Sweden

As per the Figure 6, the majority (76%) of the respondents are full time students. Further, it is a point to be noted that there is a significant margin of 52% difference between the full time and part-time students in the selected sample.

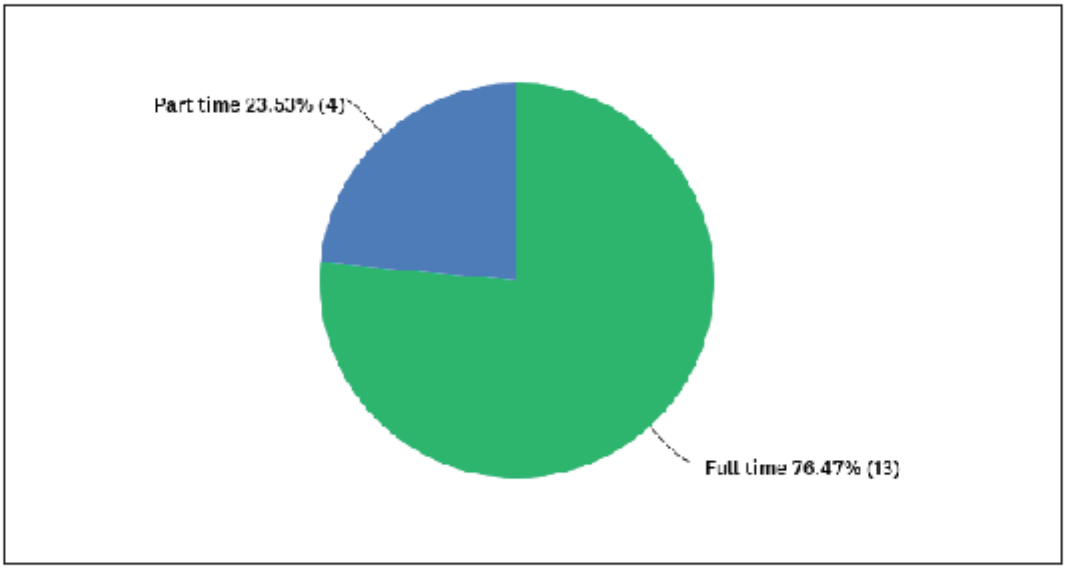

Figure 2.24: Full-time or part time studentship - Sweden

In terms of the modality of the course, while majority follow it on campus, there is a considerable amount that follow the course in the hybrid mode.

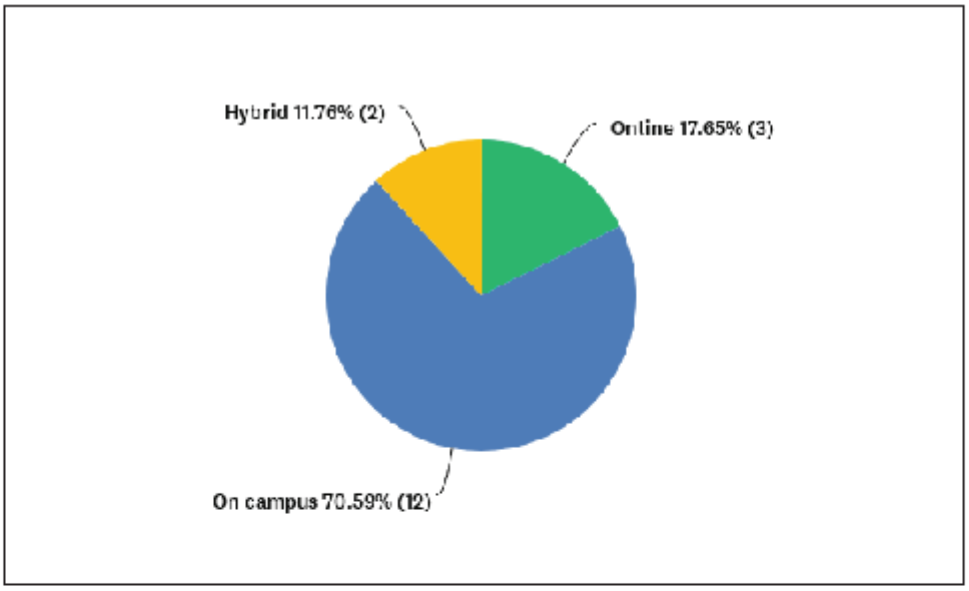

Figure 2.25: Mode of study - Sweden

Out of the total respondents, majority of them were residing in the Sweden. There are few who are residing in Italy, Spain and Tanzania.

2.1.4. Lithuania

2.1.4.1. Approach and Survey Results

The survey proportion of the Output 1 of the Lithuanian context was conducted via the online survey platform SurveyMonkey. The survey was conducted utilising a purposive sample where the targeted respondents were identified based on the Lithuanian country context. The initial recognised target groups were undergraduate and postgraduate students following courses relevant to Disaster Risk Reduction in the Vilnius Gediminas Technical University (VILNIUS TECH).

The said targeted respondents were approached through the relevant Lecturers/Professors to share the questionnaire among their students of the courses.

- Total Respondents – 15

2.1.4.2. Demographic information of the respondents

The demographic details covered by the questionnaire is the gender of the respondents and their ethnicities. The following figures of 1 and 2 depicts the summary of the gender and the ethnic profiles of the respondents.

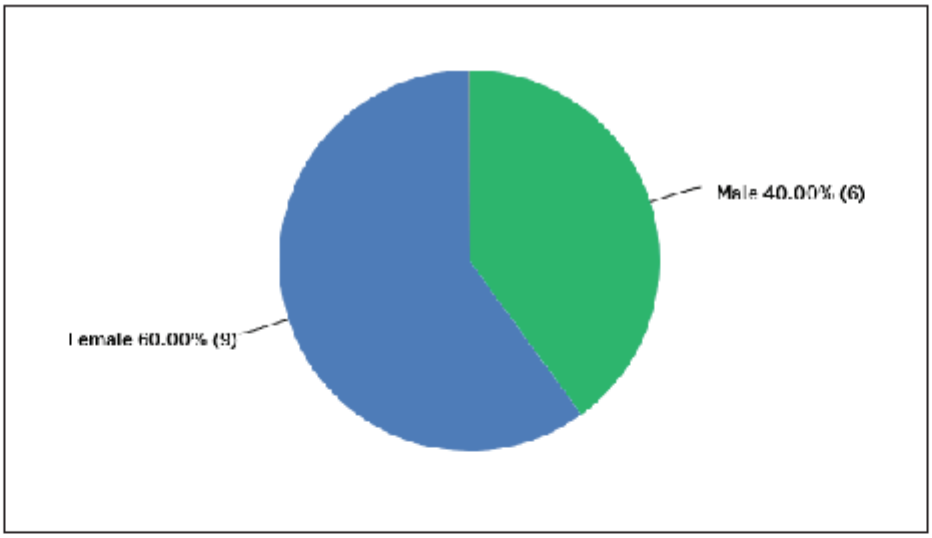

Figure 2.26: Gender of the respondents - Lithuania

As per the above Figure 1, the majority of respondents (60%) were female. However, there is a notable number of respondents who are female with a percentage of 40%. The sample does not represent students who are non-binary or the ones who prefer not to reveal their gender.

On the other hand, in terms of the ethnicity of the respondents, the following figure depicts that the respondent sample covers respondents who only belong to the category of White. Hence, the sample does not represent any respondents who have mixed ethnicities or who come from black, Asian (Chinese), Asian (other) and Arab ethnic backgrounds.

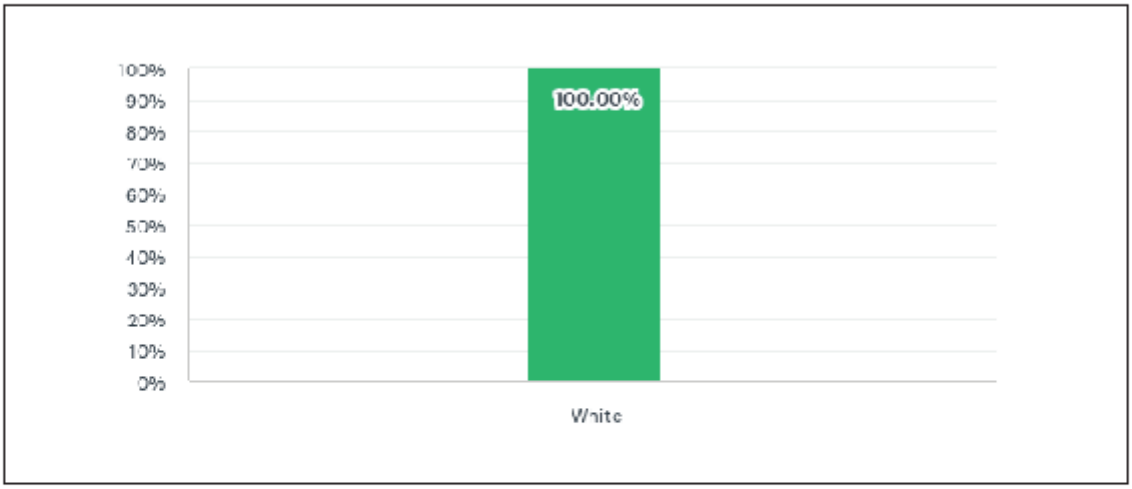

Figure 2.27: Ethnicity of the respondents - Lithuania

2.1.4.3. DRR course the respondents have enrolled in

The DRR courses the respondents have been enrolled into revealed subjects matters that is directly linked to the context of DRR. Main themes that were derived from the courses that were mentioned by the respondents are:

- Smart Cities
- Online and biometric decision making for business management

The above recognized themes depict a wider context of the concept of DRR and it shows how various courses contribute towards exploring several related aspects of DRR. When the duration of these courses was inquired all the respondents have responded as their courses run only for one year.

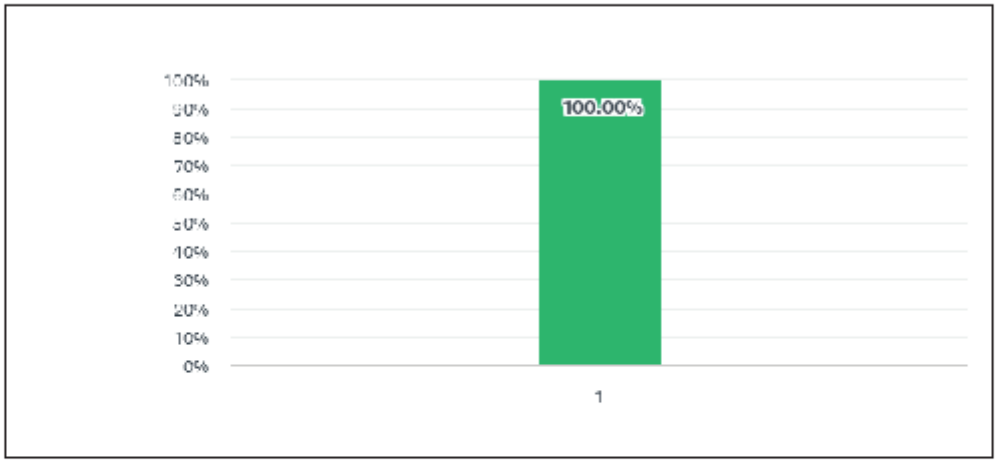

Figure 2.28: Duration of the DRR courses – Lithuania

2.1.4.4. The qualification the respondents have/has enrolled in

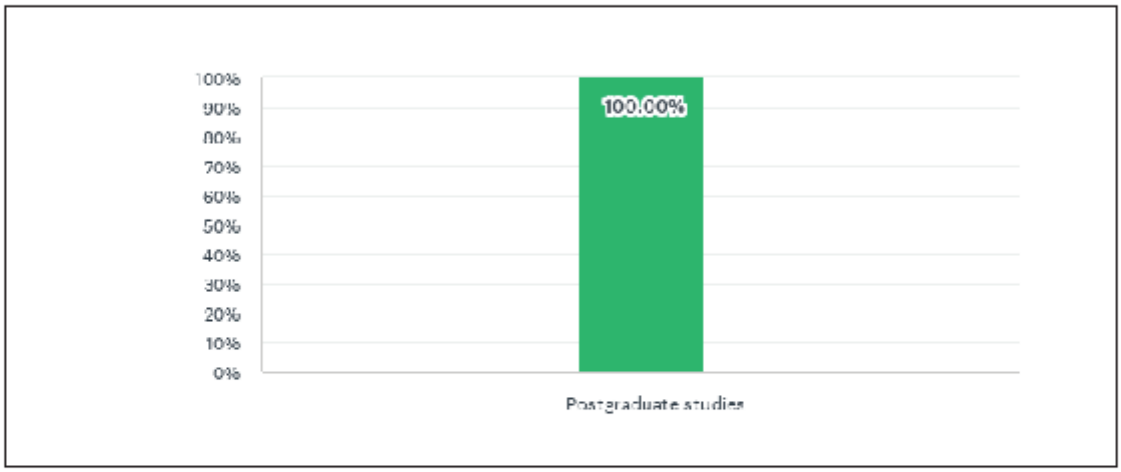

Figure 2.29: Level of qualification of the respondents - Lithuania

It is notable that all the respondents who follow postgraduate studies. However, this sample does not represent undergraduates or PhD candidates.

Even though all the respondents claim that their courses are only 1 year, 7% responded that they are in their 2nd year which is their extended year.

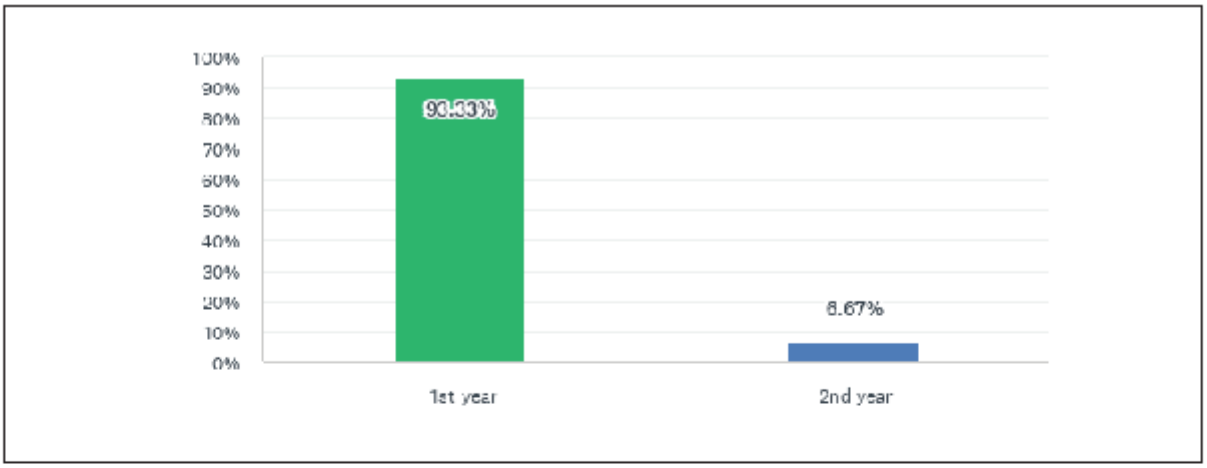

Figure 2.30: The year respondents are currently studying in - Lithuania

As per the Figure 6, all the respondents are full-time students. Further, as per the Figure 7 all the respondents follow the course in hybrid mode. This shows there the students do have a significant exposure to online learning as per their hybrid mode.

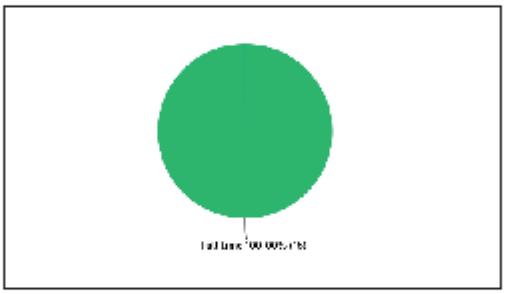

Figure 2.31: Full-time or part time studentship – Lithuania

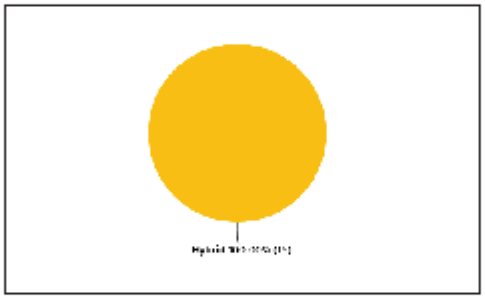

Figure 2.32: Mode of study - Lithuania

Out of the total respondents, all of them are residing in Lithuania and there are no respondents who follow the course distantly from a developing country.

2.2. Online, distance learning/teaching strategies used in DRR education (State of art digital disaster education)

Following a brief discussion on the background on the respondents and the DRR courses they have enrolled in, this section discusses the online, distance learning/teaching strategies used in DRR education by the respondents. The questionnaire presented the following strategies and inquired the utility of the given strategies by the respondents in their respective courses:

Strategy	Allocated code
A shared online platform containing e-learning tools and online components of courses/module	A
Combination of classroom-based and online-based instructions for the same module/course	B
Freely available educational online courses aiming an unlimited participation	C
Courses/modules where students can only attend live lectures and obtain instant feedback/ response	D
Courses/modules where the learning content is available at different learning systems and forums and not available in the form of live classes/ lectures	E
Courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums	F

Online learning as a group where a student learns just a piece of the material, then teach it to the group. The group then works together to synthesize the information and create a presentation about what they've learned	G
Class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt	H
Game-based learning/teaching (ex: Kahoot)	I
An online space for students to link with the practitioners	J
A portal site to share knowledge amongst students from different disciplines in the same subject area	K
Participative learning where all the students are heard equally, and the classroom teacher holds no specific power or authority in the interactions (Cogenerative learning)	L

Table 2.1: Online, distance learning/teaching strategies used in DRR education

The summary of the status quo of the use of the aforementioned strategies could be summarized as follows:

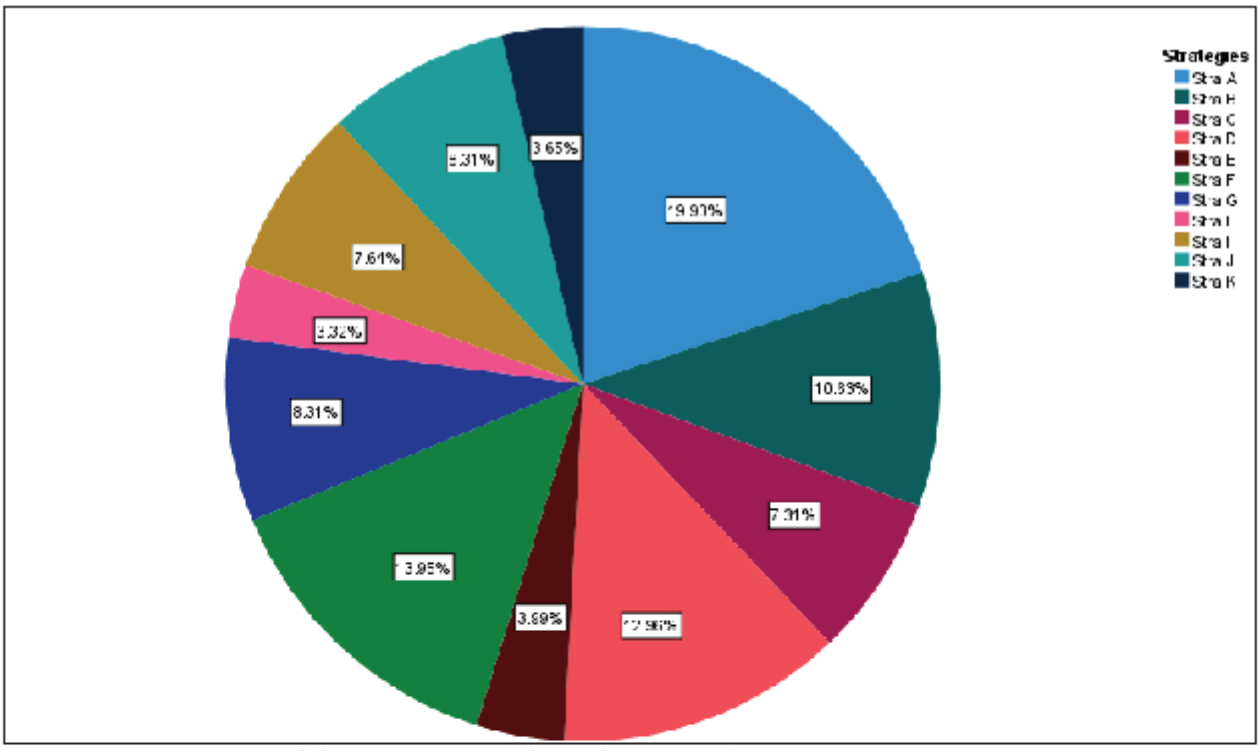

Figure 2.33: Status quo of the strategies used in online DRR education

As per the above figure, the majority of the respondents tend to utilize the strategy of a shared online platform containing e-learning tools and online components of courses/module. This indicates the high use of LMS and virtual learning environments in the DRR courses the respondents have enrolled in. A considerable amount also utilises the strategies of:

- Courses/modules where students can only attend live lectures and obtain instant feedback/ response
- Courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums

This shows a higher tendency of the respondents to participate in live lectures where the respondents could get the instant feedback for their concerns. The lowest amount of student tends to use the strategy of class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt. This shows the self-learning approach is yet to be developed within the DRR course contents.

It is further vital to inquire the status quo of the utility of these strategies based on the country and geographical contexts this survey was conducted:

			Country context				
			UK	Sweden	Lithuania	Asia Pacific	Total
Strategies	A	Count	21	7	6	26	60
	B	Count	12	5	15	0	32
	C	Count	11	0	3	8	22
	D	Count	7	4	8	20	39
	E	Count	7	1	1	3	12
	F	Count	11	5	6	20	42
	G	Count	5	3	1	16	25
	H	Count	3	0	0	7	10
	I	Count	0	4	14	5	23
	J	Count	8	1	0	16	25
	K	Count	4	1	0	6	11
	L	Count	5	4	2	10	21
Total		Count	36	15	15	53	119

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

Table 2.2: Status quo of the strategies used in online DRR education based on country contexts

A shared online platform containing e-learning tools and online components of courses/module is a strategy that is commonly used in the contexts of the UK and Asia Pacific. While majority of combination of classroom-based and online-based instructions for the same module/course is utilised in the Lithuanian context, it is not utilised in the Asian Pacific context. Freely available educational online courses aiming an unlimited participation is mainly utilized in the UK context and it is notable that it is not utilized in the Sweden context. Majority of the Asian pacific context utilizes courses/modules where students can only attend live lectures and obtain instant feedback/ response and courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums. It is a point to be noted the use of courses/modules where the learning content is available at different learning systems and forums and not available in the form of live classes/ lectures, class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt and a portal site to share knowledge amongst students from different disciplines in the same subject area are comparatively low in all the country contexts. Further, Game-based learning/teaching (ex: Kahoot) is a strategy that is significantly used in the Lithuanian context.

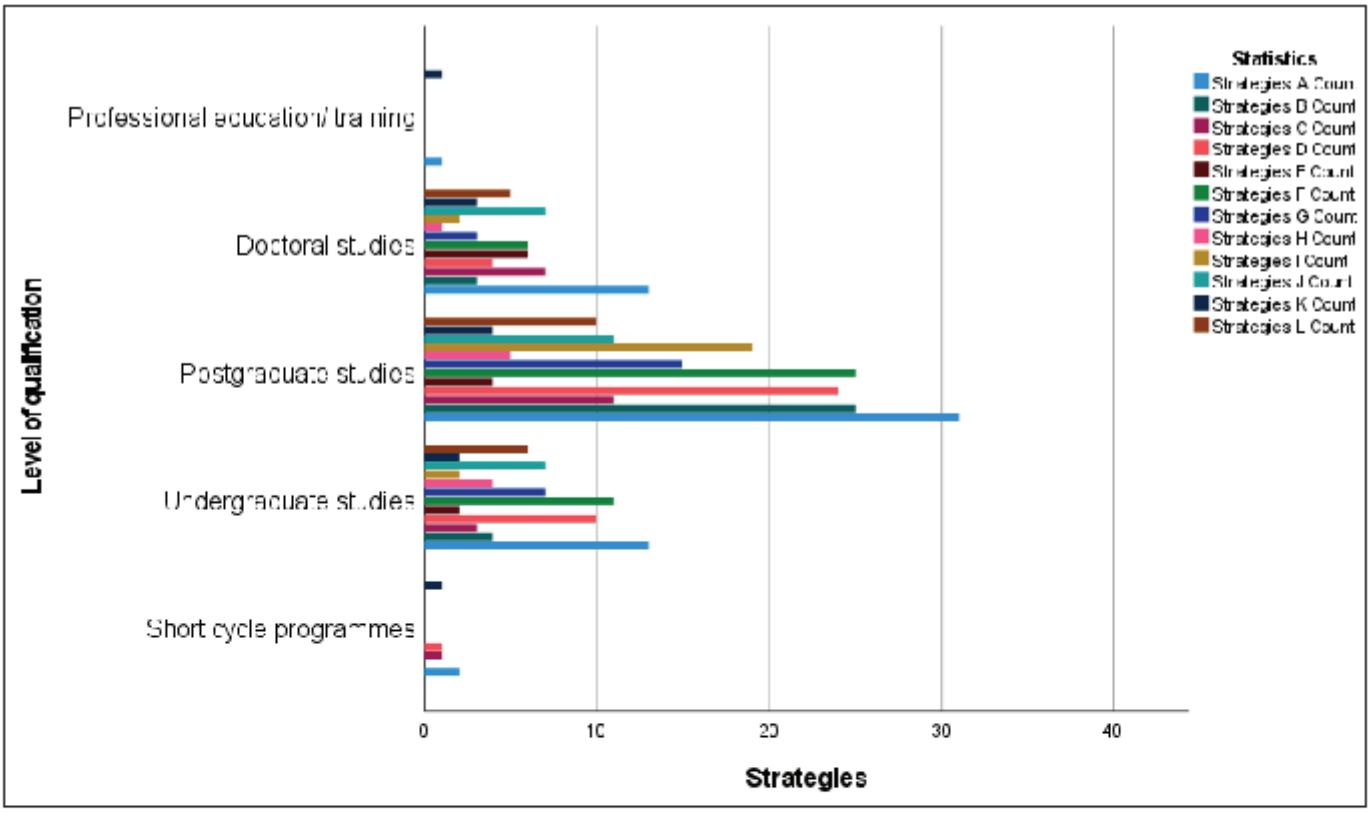

Figure 2.34: Status quo of the strategies used in online DRR education based on the level of qualification

It is vital to evaluate these strategies against the specific programme the respondents have enrolled in. as per the above figure, a shared online platform containing e-learning tools and online components of

courses/module is the most dominant strategy that is utilised in all the educational programmes. In undergraduate studies, courses/modules where students can only attend live lectures and obtain instant feedback/ response and courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums are other two strategies that are dominantly used. Combination of classroom-based and online-based instructions for the same module/course, Courses/modules where students can only attend live lectures and obtain instant feedback/ response and courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums are the other dominant strategies used in postgraduate studies. On the other hand, freely available educational online courses aiming an unlimited participation and an online space for students to link with the practitioners are the other main strategies utilised in the PhD programmes. On the other hand, class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt and a portal site to share knowledge amongst students from different disciplines in the same subject area are the least used strategies across the programmes.

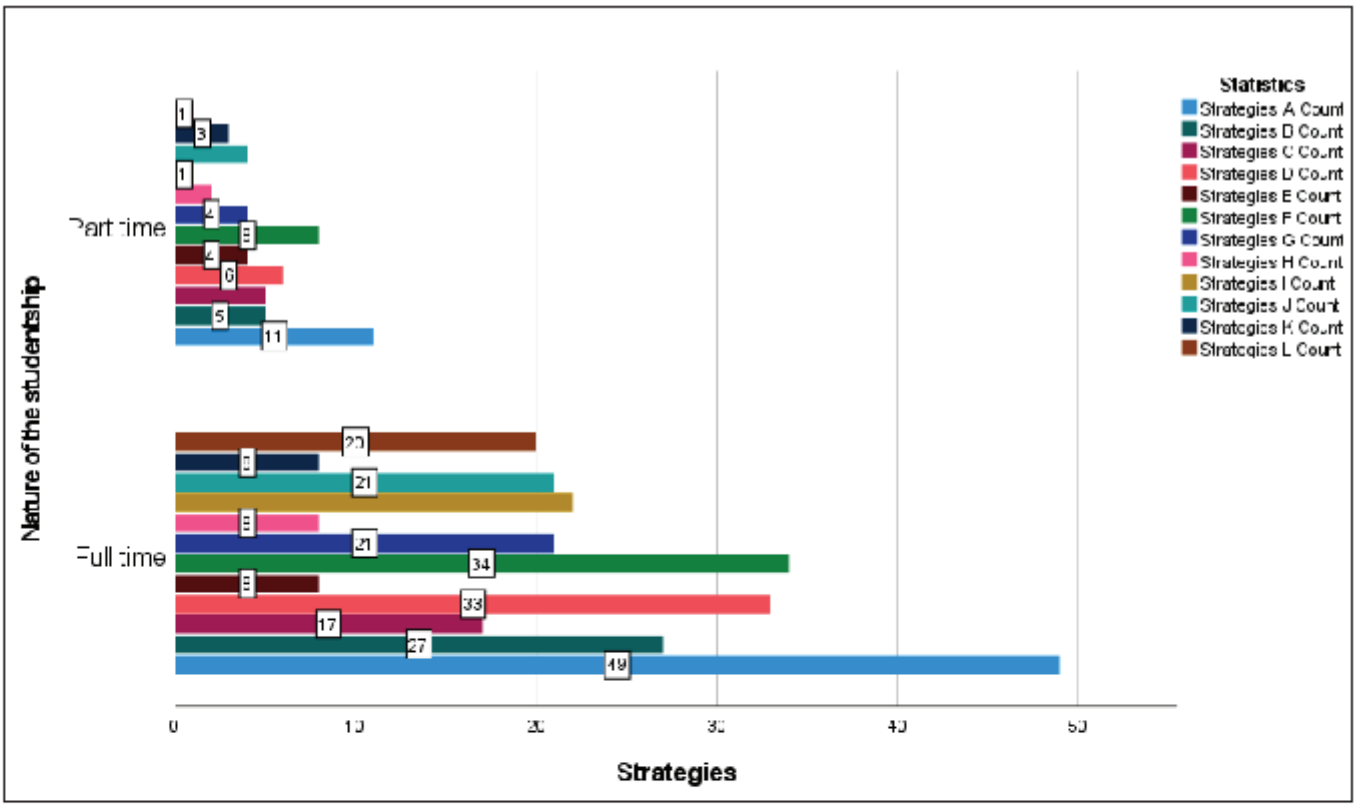

Figure 2.35: Status quo of the strategies used in online DRR education based on the nature of the studentship

The above figure inquires the use of learning strategies as per the time commitment students are supposed to give in their enrolled courses. However, the results do not show a significant change

between the strategies used by full-time and part-time students. The majority of the both programmes utilizes a shared online platform containing e-learning tools and online components of courses/module. Use of courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums is also significant in both programmes. Class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt and a portal site to share knowledge amongst students from different disciplines in the same subject area hold the lowest response in both programmes in comparison to other strategies.

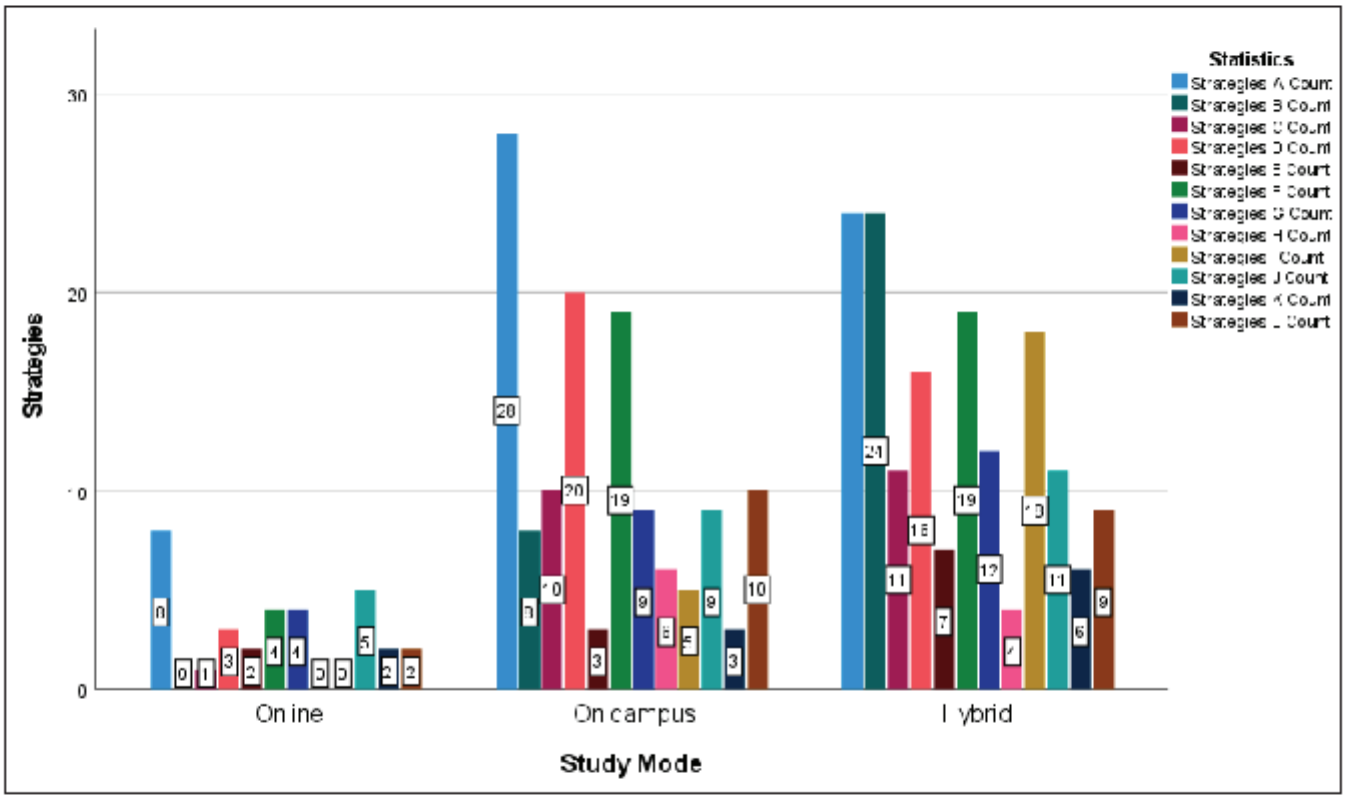

Figure 2.36: Status quo of the strategies used in online DRR education based on the mode of study

Next, when evaluating the use of the strategies as per the learning mode, all online, on campus and hybrid modes utilize a shared online platform containing e-learning tools and online components of courses/module. Class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt and A portal site to share knowledge amongst students from different disciplines in the same subject area hold the lowest response in all three modes. Further, Courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums is a notable strategy in all three modes. Similarly, the strategy Courses/modules where students can only attend live lectures and obtain instant feedback/ response is vital. However, Class blogs where students

explore self-learning by creating a blog individually or in a group about what they have learnt and Game-based learning/teaching (ex: Kahoot) are not utilised in online mode.

In overall discussion on the learning strategies that are being used in online DRR education, it is vital that the strategies that are dominantly used are more biased towards instructor-led learning (Schlesinger et al., 2021) than self-directed (Schlesinger et al., 2021) or self-regulated learning (Carter et al., 2020). While the strategies are more biased towards strategies that give away instant feedback, it reiterates with the ideas of Lipnevich and Smith (2022) on the importance of feedback in a learning environment. Further, the mostly common used strategy across the countries and variety of programmes is the Learning Management System (LMS) which could be defined as platforms that incorporate course information and Modules as well as tools that enhance the learning experience through a shared administrative interface (Nichols, 2003). It has been recognised as an online tool that is used to create structure for the pedagogical arrangements set by higher education institutes (Al-Mamary, 2022). Even though Davidson (2020) has pointed out that higher interaction to be a major contributing factor for a better learning experience for students, the strategies utilised are mostly promote the real-time interactions between the learners and the educators that could be recognised as synchronous learning (Bruscato & Baptista, 2021; Littlefield, 2018). There is a lack of use in active learning pedagogical methods where the interactions among the students are encouraged (Bonwell et al., 1991). Active learning strategies are indeed recognised as characteristics of good learning contexts (Biggs and Tang, 2011). However, it is notable that respondents who are PhD candidates are utilising such techniques where they interact with industrial experts and other students.

2.3. Impact of student-specific challenges/difficulties for online and distance DRR education

Having explained the strategies that are dominantly used in the online DRR education, this section covers the elements of the questionnaire where the challenges faced by the DRR learner. the respondents were asked in general on the following common challenges for online and distance education:

Challenge	Allocated Code
None of the above	I
Inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies	II
Lack of essential online teaching and learning skills	III
Data cost and cost of accessibility (to learning content)	IV
The anonymity of learners leading to questioning their academic integrity due to increased cheating and plagiarism related problems.	V
Threats to the e-learners' information	VI
Discontinuity of education due to personal reasons that affected effective participation in education on the same footing as others.	VII
Emotional disturbances and health issues due to prolonged screen/digital device use	VIII
Rules, regulations, and policies imposed by education institutions regarding the mix of online education and fieldwork/on-campus learning becoming insufficient and unsuccessful.	IX

Table 2.3: Common challenges for online and distance education

Out of the aforementioned challenges, it is notable that the majority have claimed that none of the mentioned challenges are considered to be a challenge for the respondents. However, the following challenges records are the recognized challenges as with the highest number of responses:

- Inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies
- Discontinuity of education due to personal reasons that affected effective participation in education on the same footing as others
- Emotional disturbances and health issues due to prolonged screen/digital device use

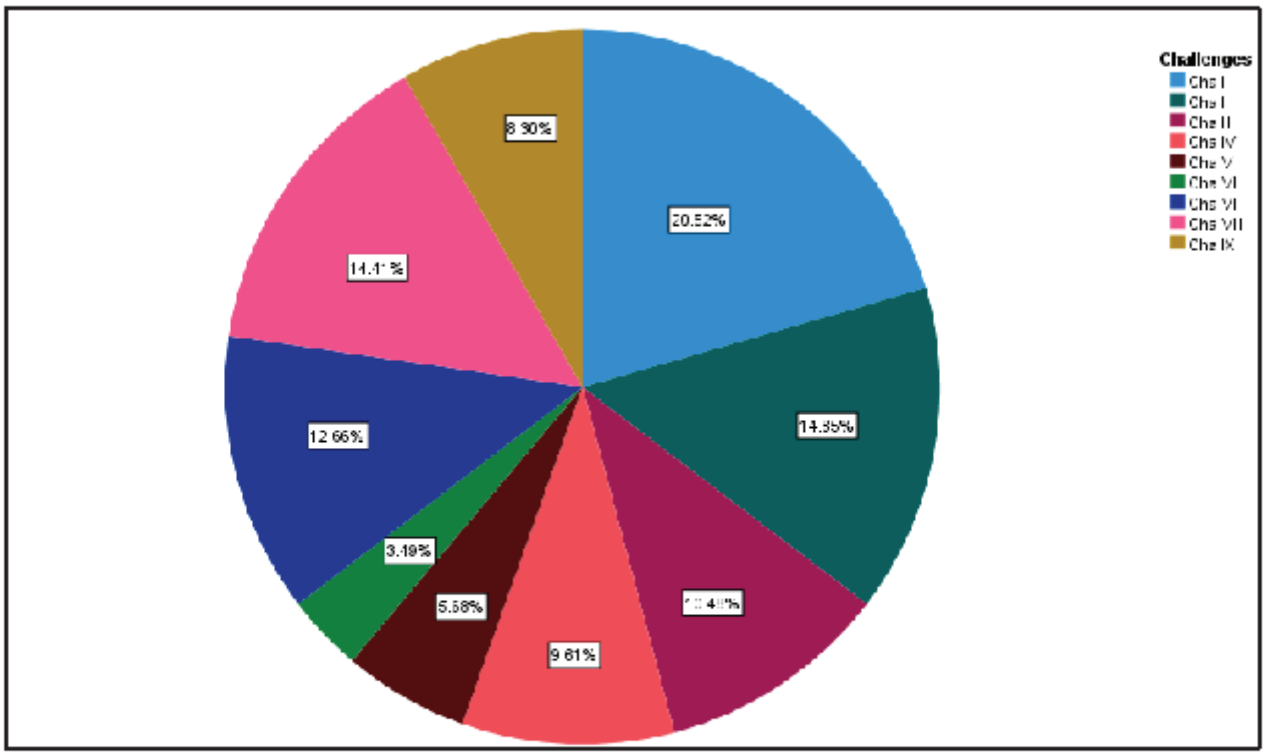

Figure 2.37: Challenges faced by the respondents in online DRR education

The following table summarises the status quo of the challenges as per the country/geographical contexts:

			UK	Sweden	Lithuania	Asia Pacific	
Challenges	I	Count	13	9	13	12	47
	II	Count	11	2	2	19	34
	III	Count	7	2	0	15	24
	IV	Count	4	0	1	17	22
	V	Count	2	0	1	10	13
	VI	Count	0	1	0	7	8
	VII	Count	9	1	2	17	29
	VIII	Count	10	3	0	20	33
	IX	Count	6	1	1	11	19
Total		Count	33	13	15	62	123

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

Table 2.4: Challenges faced by the respondents in online DRR education based on country contexts

Inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies is a notable challenge in the UK and Asia Pacific contexts. It is notable that the Asia pacific context records all the challenges with a significant amount of responses. While Lack of essential online teaching and learning skills is not recorded as a major challenge in the Lithuanian context, Data cost and cost of accessibility (to learning content) and the anonymity of learners leading to questioning their academic integrity due to increased cheating and plagiarism related problems are not recorded as challenges in the Sweden contexts. Further, Threats to the e-learners' information is a challenge that is not recorded as a challenge in the UK context.

While having a discussion on the challenges, it is vital see the relationship between the use of various DRR learning strategies and the aforementioned challenges. The summary of the challenge as per the most and least significant strategies could be summarised as follows:

Challenge	Most significant strategy	Least significant strategy
Inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies	Courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums	Class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt
Lack of essential online teaching and learning skills	Freely available educational online courses aiming an unlimited participation/ Courses/module where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums	Class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt
Data cost and cost of accessibility (to learning content)	Courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums	A portal site to share knowledge amongst students from different disciplines in the same subject area

The anonymity of learners leading to questioning their academic integrity due to increased cheating and plagiarism related problems.	Online learning as a group where a student learns just a piece of the material, then teach it to the group. The group then works together to synthesize the information and create a presentation about what they've learned	Game-based learning/teaching (ex: Kahoot)
Threats to the e-learners' information	Courses/modules where students can only attend live lectures and obtain instant feedback/ response/Online learning as a group where a student learns just a piece of the material, then teach it to the group. The group then works together to synthesize the information and create a presentation about what they've learned	Class blogs where students explore self-learning by creating a blog individually or in a group about what they have learnt/ A portal site to share knowledge amongst students from different disciplines in the same subject area/ A portal site to share knowledge amongst students from different disciplines in the same subject area
Discontinuity of education due to personal reasons that affected effective participation in education on the same footing as others.	Courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums	A portal site to share knowledge amongst students from different disciplines in the same subject area
Emotional disturbances and health issues due to prolonged screen/digital device use	Courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning content is available at different learning systems and forums	A portal site to share knowledge amongst students from different disciplines in the same subject area
Rules, regulations, and policies imposed by education institutions regarding the mix of online education and fieldwork/on-campus learning becoming insufficient and unsuccessful.	Courses/modules where students can attend live lectures and obtain instant feedback/ response and sometimes the learning	Class blogs where students explore self-learning by creating a blog individually or in a group about what they

	content is available at different learning systems and forums	have learnt/ Game-based learning/teaching (ex: Kahoot)

Table 2.5: Summary of challenges faced by the respondents in online DRR education and the most and least significant learning strategies

The challenges encountered by the respondents could be further analyzed through the lenses of the time duration and the mode of study the students engage in their learning process.

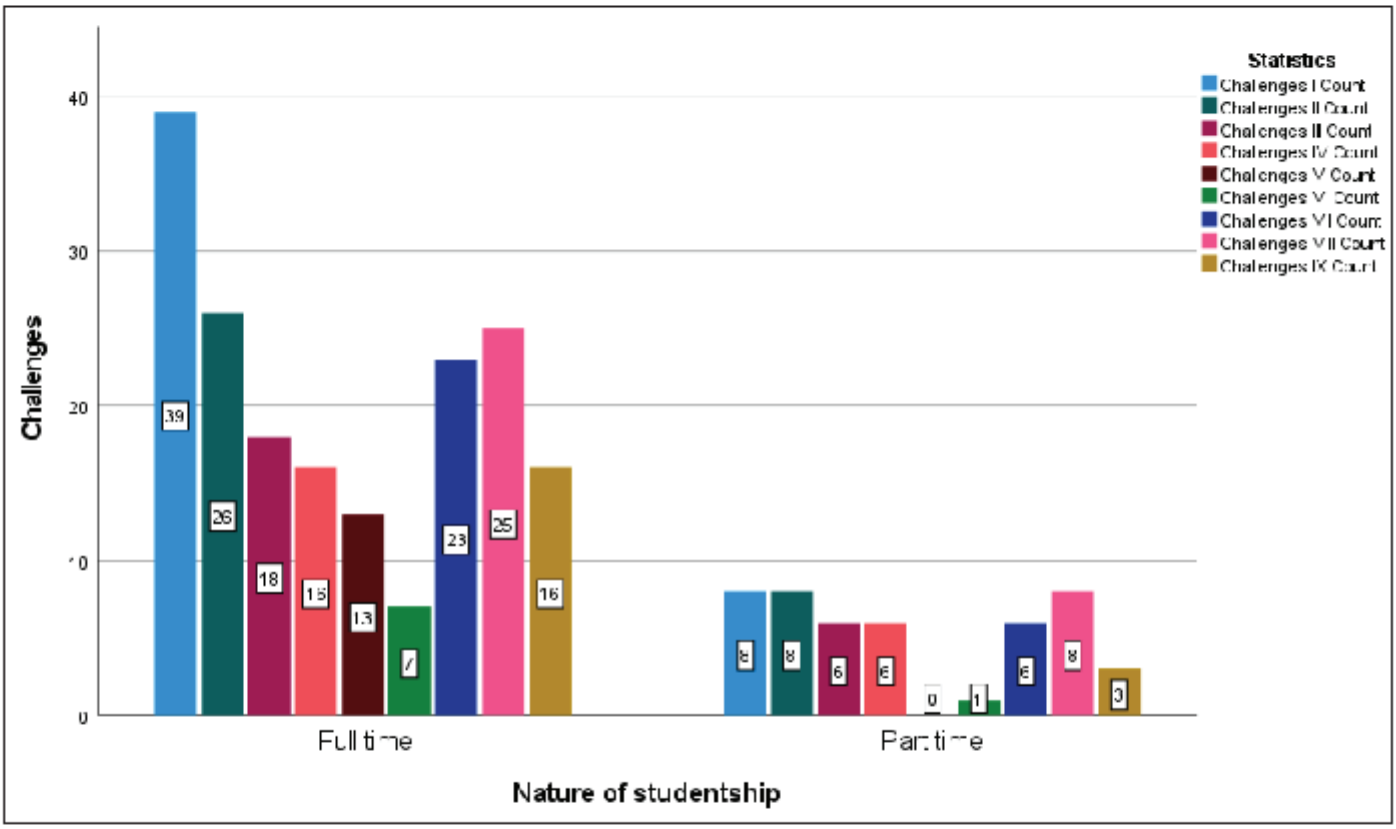

Figure 2.38: Challenges faced by the respondents in online DRR education based on the nature of the studentship

As per the above table, in terms of the challenges encountering in the DRR learning process, the following could be highlighted as the major challenges encountered by the full-time students:

- Inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies
- Discontinuity of education due to personal reasons that affected effective participation in education on the same footing as others
- Emotional disturbances and health issues due to prolonged screen/digital device use

On the other hand, the part-time students do not consider the anonymity of learners leading to questioning their academic integrity due to increased cheating and plagiarism related problems as a challenge. On the other hand, the following have been selected as their major challenges:

- Inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies
- Emotional disturbances and health issues due to prolonged screen/digital device use

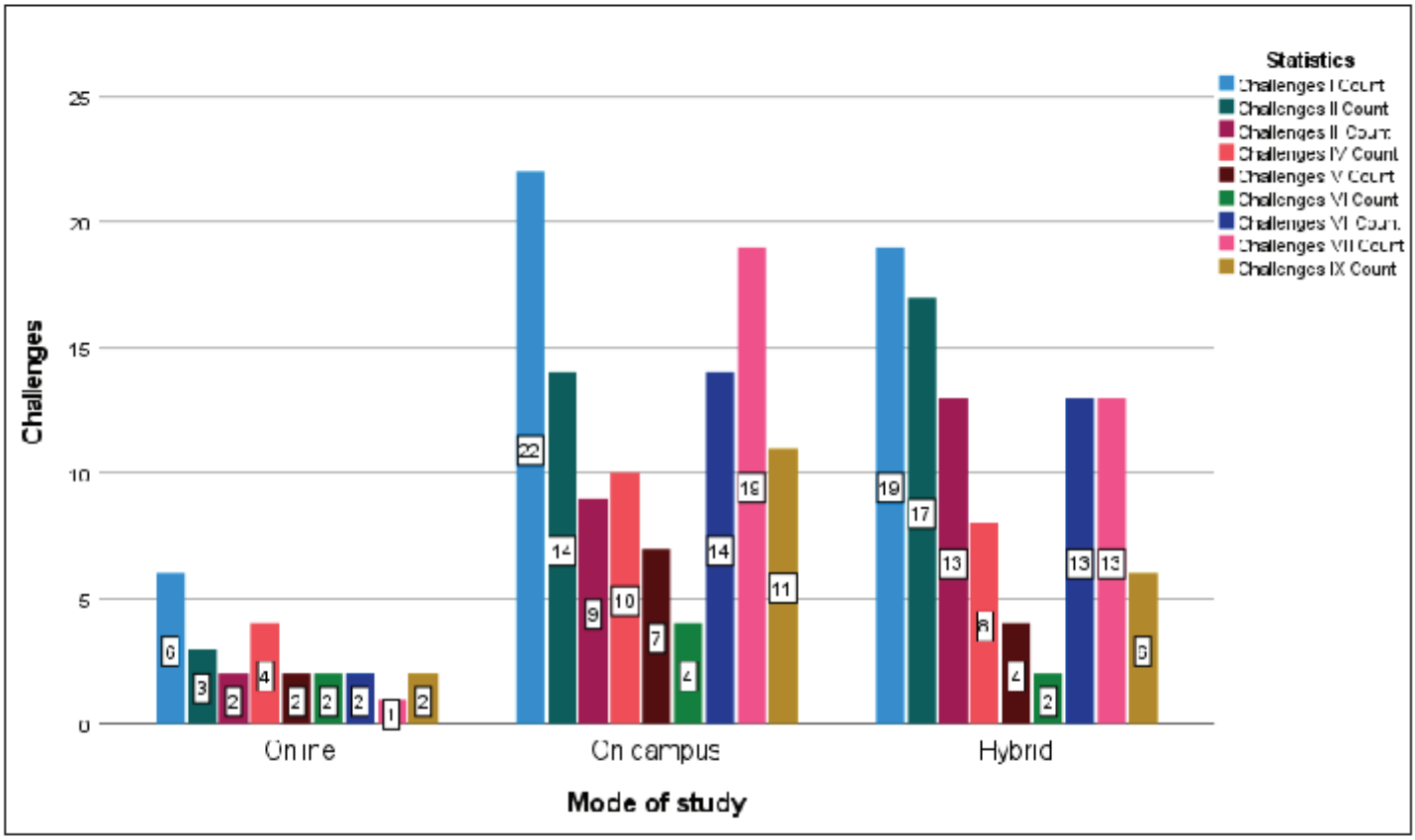

Figure 2.39: Challenges faced by the respondents in online DRR education based on the mode of study

As per the above figure, it is notable that the selected sample represents a lower proportion of online learners. However, out of the said respondents it is vital to recognize that the respondents are not disregarding any of the presented challenges. Even though the majority of the respondents whose study mode is online considers none as challenges, a considerable amount recognizes Data cost and cost of accessibility (to learning content) as a significant challenge. On the other hand, the respondents who learn on campus consider emotional disturbances and health issues due to prolonged screen/digital device use as the most significant challenge. Further, inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies and discontinuity of education due to personal reasons that affected effective participation in education on the same footing as others are also notable challenges pointed out by those respondents. It is notable that the

respondents who follow the course in the hybrid mode also consider inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies as the major challenge. Further, lack of essential online teaching and learning skills, discontinuity of education due to personal reasons that affected effective participation in education on the same footing as others, emotional disturbances and health issues due to prolonged screen/digital device use are the other notable challenges highlighted by them.

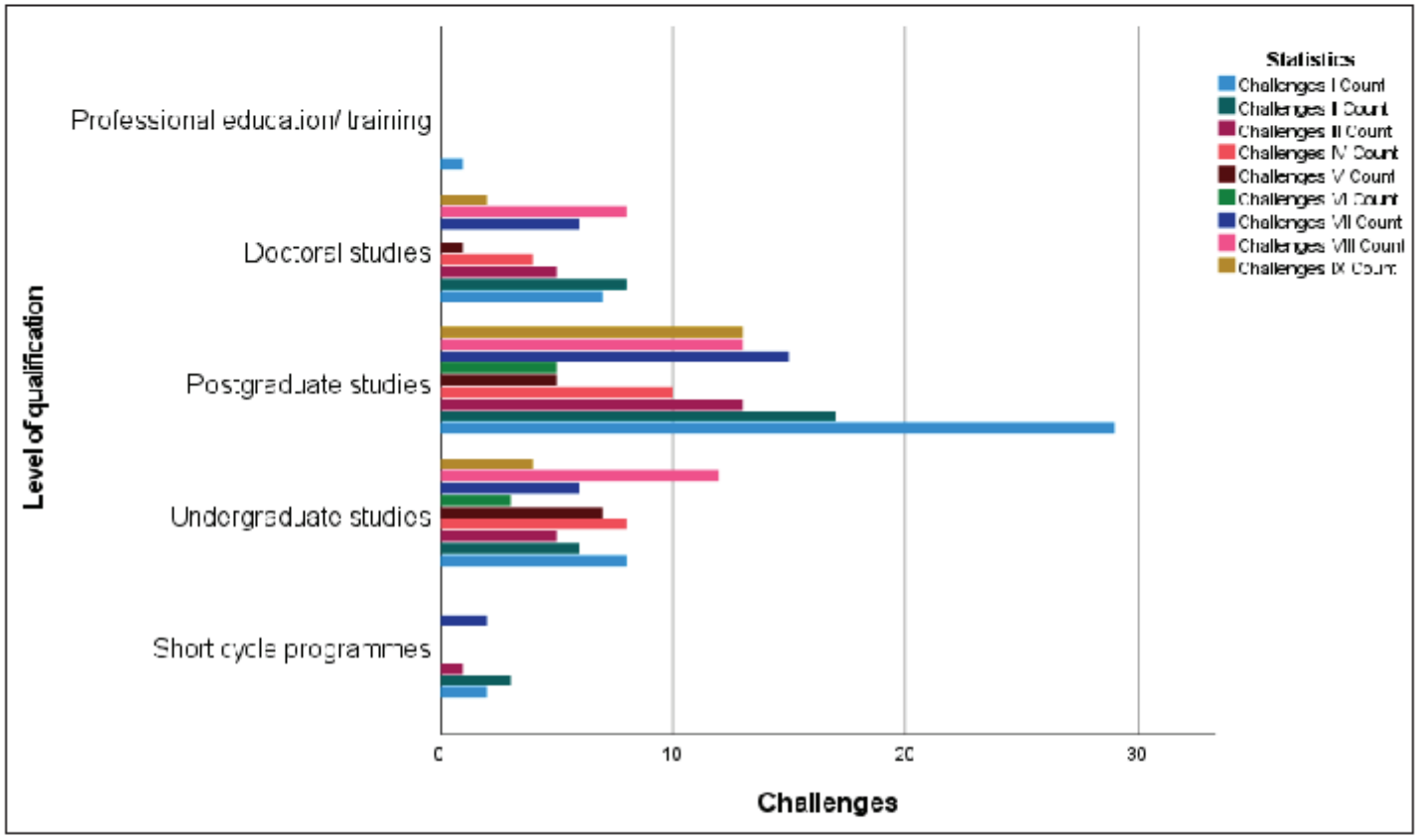

Figure 2.40: Challenges faced by the respondents in online DRR education based on the level of qualification

As per the above figure, both undergraduates and PhD candidates considers emotional disturbances and health issues due to prolonged screen/digital device use as a major change. Further, the PhD candidates also consider inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies as a considerable challenge. Further, discontinuity of education due to personal reasons that affected effective participation in education on the same footing as others is a major challenge recognised by the respondents who follow postgraduate studies.

The main challenges that have been highlighted throughout are matters related to ICT infrastructure and skills and physical and mental health related issues. In terms of availability of adequate ICT infrastructure is vital for an effective delivery of online education (United Nations, 2020). Even if the

relevant infrastructure is at place, the course interfaces should be user friendly for a better learning experience (Simamora, 2020; Makoe, 2012). On the other hand, lack of online teaching and learning skills further deteriorates the online learning experience (Albrahim, 2020; Lestiyanawati, 2020).

In terms of the health concerns associated with online education, mental health concerns such as being bored with online learning especially when learning from home, frequent changes in mood as a result of too many assignments which the students considered ineffective by students (Irawan et al., 2020; Lestiyanawati, 2020; Wargadinata et al., 2020) have been highlighted in related studies. Apart from the said mental health concerns, long hours associating digital devices as part of online education lead to multiple health issues such as backaches, frequent headaches, higher body temperature, disrupted sleep cycles, unhealthy increase in body weight, etc. (Srivastava, Chopra, & Dhar-Bhattacharjee, 2021).

Given that the majority of respondents specifically the PhD candidates refer to the discontinuity due to personal reasons, it is vital to refer to related studies that have referred to this particular issue. The availability of data (Irawan et al., 2020; Lestiyanawati, 2020; Wargadinata et al., 2020) and digital literacy are commonly cited reasons in related studies for such discontinuity (Sánchez-Cruzado et al., 2021).

3. Educators' perspective – Expert interviews

This section presents the findings of the interviews conducted by the partners with educators with wide range of teaching experience in the field of DRR. The section will first introduce the profile of the interviewees and then present the findings as per the themes that were emerged during the content analysis of the interviews. The findings are mainly falling into the categories of strategies of online DRR teaching, their effectiveness and main challenges and barriers associated with online DRR education.

3.1. About the Interviewees

All the interviewees for this study have been practicing their professions 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, his/her insights and perspective on the overall teaching (given that it involves DRR elements) reflect on good competency evidence and makes 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. Data have been collected by all 5 partners of the INCLUDE project. Some partner universities offered to graduate and undergraduate programmes on/related to DRR while some universities did not have any taught courses but had DRR postgraduate researchers and research active in the means of centre-based learning (for example; HUD). Hence, the interview was conducted across different universities in the 4 countries where the partner universities are located (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, Hong Kong, India, Indonesia, Japan, Philippines, etc. Therefore, the above sample mainly is a representation of educators from 4 countries, i.e. United Kingdom, Japan, Sweden, and Lithuania, but is not limited to. The exceptions and special remarks are indicated clearly in the report. Table 3.1 is a summary of the details of the participants in this study.

Table 3.1: Interviewee information

No	Interviewee ID	Current job title/role	Years of experience	Experience in teaching/ delivering DRR courses/modules	Experience in designing DRR courses/modules
1	E_UK_HUD_1	Senior tutor	7 years	Yes	Yes
2	E_UK_HUD_2	Associate Professor/ Senior lecturer	15 years+	Yes	No
3	E_UK_HUD_3	Professor	24 years	Yes	No
4	E_UK_HUD_4	Senior lecturer	12 years	Yes	Yes
5	E_UK_HUD_5	Professor	32 years	Yes	Yes
6	E_UK_HUD_6	Professor	42 years	Yes	Yes
7	E_UK_HUD_7	Senior lecturer	12 years	Yes	Yes
8	E_UK_HUD_8	Senior lecturer	9 years	Yes	No
9	E_UK_HUD_9	Lecturer	4 years+	Yes	Yes
10	E_UK_HUD_10	Reader and Director of Equity, Diversity, and inclusion	15 years	Yes	Yes
11	E_UK_HUD_11	Senior lecturer	15 years	Yes	Yes
12	E_UK_UCLAN_1	Deputy head	17 years	Yes	Yes
13	E_UK_UCLAN_2	Senior lecturer	7 years	Yes	Yes
14	E_UK_UCLAN_3	Professor	20+ years	Yes	Yes
15	E_UK_UCLAN_4	Senior lecturer	9 years	Yes	Yes

16	E_UK_UCLAN_5	Lecturer	14 years	Yes	Yes
17	E_UK_UCLAN_6	Senior lecturer	22 years	Yes	Yes
18	E_UK_UCLAN_7	Senior lecturer	29 years	Yes	Yes
19	E_UK_UCLAN_8	Senior lecturer	19 years	Yes	Yes
20	E_J_KEIO_1	Associate Professor	10 years	Yes	Yes
21	E_J_KEIO_2	Associate Professor	15 years	Yes	Yes
22	E_J_KEIO_3	Associate Professor	8 years	Yes	No
23	E_J_KEIO_4	Associate Professor-	20 years	Yes	Yes
24	E_J_KEIO_5	Associate Professor	16 years	Yes	Yes
25	E_J_KEIO_6	Professor	18 years	Yes	Yes
26	E_J_KEIO_7	Assistant Professor	7 years	Yes	Yes
27	E_J_KEIO_8	Professor	20 years	Yes	Yes
28	E_J_KEIO_9	Professor	17 years	Yes	Yes
29	E_J_KEIO_10	Professor	23 years	Yes	Yes

30	E_SW_LU_1	PHD student	4 years	Yes	Yes
31	E_SW_LU_2	Associate professor	9 years	Yes	Yes
32	E_SW_LU_3	Training coordinator	3 years	Yes	Yes
33	E_SW_LU_4	Associate Professor-	20 years	Yes	Yes
34	E_SW_LU_5	Training coordinator	3 years as an educator	Yes	Yes
35	E_SW_LU_6	Capacity development and Learning Development expert	10 years	Yes	Yes
36	E_SW_LU_7	Programme officer	14 years	Yes	Yes
37	E_SW_LU_8	Associate Professor	17 years	Yes	Yes
38	E_SW_LU_9	Associate Professor	14 years	Yes	Yes
39	E_SW_LU_10	Associate Professor, Scientific advisor	15 years	Yes	Yes
40	E_SW_LU_11	PhD student	9 years	Yes	Yes
41	E_LI_VGTU_1	Professor	35 years	Yes	Yes
42	E_LI_VGTU_2	Professor	30 years	Yes	Yes
43	E_LI_VGTU_3	Professor	25 years		
44	E_LI_VGTU_4	Associate professor	20 years	Yes	Yes
45	E_LI_VGTU_5	Associate Professor	23 years	Yes	Yes
46	E_LI_VGTU_6	Associate Professor	18 years	Yes	Yes

47	E_LI_VGTU_7	Associate Professor	21 years	Yes	Yes
48	E_LI_VGTU_8	Associate Professor	19 years	Yes	Yes

In the above Interviewee labelling,

E= Educators

HUD = University of Huddersfield

UCLAN = University of Central Lancashire

LU = Lund University

VGTU = Vilniaus Gedimino technikos universitetas

KEIO = Keio University

UK = United Kingdom

SW = Sweden

LI = Lithuania

JP = Japan

3.2. Online, distance learning/teaching strategies used in DRR education (State of art digital disaster education)

Online teaching strategies

In understanding the state of art digital disaster education, the experts were initially asked about their experience and familiarity. The experience and familiarity were evaluated based on their involvement and understanding of the key online course/ module delivery methods/pedagogical approaches. Five key online course/ module delivery methods/pedagogical approaches were a result of the literature analysis and an explanation was given in the interview guideline to avoid misinterpretations. Accordingly, the educators described the means through which they experienced the listed key approaches and their evaluation of the effectiveness of each approach, from the perspectives of tutors and students. Table 3.2 summarises the results of the experience and effectiveness of the 5 key online delivery methods.

Table 3.2: Educators' experience and their evaluation of the effectiveness of the listed online delivery methods.

Online course/ module delivery methods/pedagogical approaches	Experience	Effectiveness	
		For tutors	For students
Only Synchronous Learning	All interviewees, except for 1 interviewee that was interviewed by KEIO had experience with only synchronous learning. The main experience of the interviewees came from the sudden shift to an online setting during the pandemic. Courses that were not designed to be online had to be re-adapted to this format. Features like live lectures and instant feedback were identified as vital in teaching DRR. In fact, most of the Interviewees in Sweden described synchronous online learning as a "second best option" compared to physical classroom teaching while SW_LU_6 argued it as a more effective approach than face-to-face learning when done properly and with passion. Seeing the students helped the educators better understand their paces, and responses and instantly adapt the content accordingly. However, in most situations students have not switched on the	Effective circumstances- ✓ if it's a small classroom (as per JP_KEIO_5, around 20 students) and if student engagement is very much needed (UK_HUD_1- "if it's a small classroom, it's always effective and practical to do a few teaching activities like student engagement activities, group work") ✓ a session that needs community, student engagement ✓ according to UK_HUD_6, instant feedback and discussion when trying to explain disaster risk management are critical (UK_HUD_6- "It's probably the most beneficial. And I say that because I think a subject like a Disaster Risk Reduction is complex. And I think it doesn't lend itself to specific techniques or approaches, so it's not like teaching mathematics.	Positive- ✓ they can always discuss their experience (knowledge sharing from students with industry experience) ✓ get any issues clarified then and there ✓ they could either speak up or they could chat (UK_HUD_8- Possibly it might be better in that way if some students, might be a little bit shy to speak up in the class face to face what they tend to chat.) Negative- ✓ not effective when the students are not responsive and engaging. ✓ If more dominant students are interacting throughout a lesson, it may be more difficult for less

	cameras and mandating the use of cameras was difficult. This has resulted in a loss of expressive connection between the tutor and students. Moreover, it was difficult to implement ideas of good practice for online or virtual learning and very easily tutors fell into the practice of just talking like a lecture, which was unfavourable. For instance, UK_HUD_9 stated "It's really hard for synchronous learning sort of environments to implement kind of ideas of good practice for online or virtual learning. So even things like having short videos or kind of talking for short spaces of time that things that you would practice, you were entirely synchronous. They're really hard to implement when you are kind of in a synchronous kind of environment. So, it's very easy to fall into the practice of the kind of just talking like a lecture, which we all know is not hugely good practice." This has led most respondents in the UK context to evaluate only synchronous learning as a poor experience. Overall there were positive experiences as well as negative experiences. Positive experience however came from the integration of different digital tools assisting online synchronous education. Some of the tools mentioned were the	Instant feedback and discussion when trying to explain disaster risk management are absolutely critical." ✓ helped the tutor as well as the students to accommodate the student who is differently-abled in terms of cognitive skills. ✓ Effective with a strategy (for example; emailing the tutor) to give a voice to fewer vocal students ✓ not effective for all subjects particularly practical subjects such as engineering where students need to work hands-on to get the proper experience. Positive aspects- ✓ tutors can observe how students behave, how they respond and accordingly deliver their sessions ✓ can tailor the material to the students spontaneously in response to questions (UK_HUD_5- "adapt the content on the spot. If it's something one knows well.") ✓ helped the tutor as well as the students to accommodate the student	vocal students to ask questions that they need answering ✓ they could find it as a dry way of delivering lectures. (UK_HUD_9- conducive learning spaces at a specific time, which often means that you're delivering to students who aren't in those spaces and thus kind of aren't learning effectively) ✓ attending live sessions could be challenging for working students (happened with the sudden shift of education to only synchronous learning following the Covid-19 outbreak) ✓ reluctance to speak to an audience they have never met and that might be including their classmates ✓ Internet issues

	chat function in Zoom, Miro, Mentimeter, and Padlet.	who is differently-abled in terms of cognitive skills. Negative aspects- ✓ The challenge remains when the videos of the students were turned off. ✓ An overall response In the SW context was that non-face-to-face interaction created challenges for educators, yet generates more opportunities for interaction than all the other methods discussed. ✓ accommodating and finding a time appropriate for everyone can be challenging if the students are coming from different countries, and backgrounds (ex: working students) ✓ poor attendance and lesson retention.	
Only Asynchronous Learning	Interviewees had less experience with asynchronous learning in comparison to synchronous, though the interviewees had used asynchronous learning strategies. Some interviewees had a positive experience with this strategy, stating that the information can be learned in a more relaxing environment, where information can be learned "far	Effective circumstances- ✓ if the student cohort is big, lectures and classroom activities can be in the forms of only asynchronous learning ✓ If the is just theory being taught and no student engagement is necessary (UK_HUD_3- "in a large classroom	Positive- ✓ Flexibility (UK_HUD_2 – "can study wherever and whenever they want, whenever they have a bit of free time and mood", SW_LUND_10,11 added similar comments)

	better than in a classroom". Usually, asynchronous learning was a supporting mechanism rather than a stand-alone teaching approach (UK_HUD_9- "I've had no experience in teaching them that context, there was always some element of the kind of live session as a part of that"). All the interviewees in Sweden agreed that asynchronous learning is deemed effective only as being complementary to synchronous online learning so as to integrate the element of interaction that is defined for the effectiveness of online learning. Experts found this approach largely effective among those that have a grasp of the basic principle (and for the students who are better suited to this style) but undergraduates (UK_HUD_6 – ". for continuing professional development or people who are working in the disaster area but I wouldn't think that's directly relevant at the undergraduate level.) (UK_HUD_4 added "knowledge is available right in YouTube if you go to Google that's available but what undergraduates need from a teacher is something beyond that"). Some interviewees stated that it lacks the interaction of synchronous learning, which could lead to challenges in	environment, student engagement is always limited") ✓ if the students are willing to invest their time and if they know what they want (However, other students, are more likely to get left behind as there is nobody really encouraging them to complete the work to the deadlines. So, for these students, asynchronous learning is not effective.) ✓ The only option where you can't do everything live, possibly because of technological difficulties (UK_HUD_8 – "When we teach measurement, choose students we use dimension shapes and we used to do it on the document camera. We couldn't get the document camera input to the teams' link. We couldn't share it with online students, so we always had to do it in a class and record it and then play it to students.") Positive aspects- ✓ Saves time (UK_HUD_10- "I will not have time in my lecture to read the 20-page paper or you know, even like a six-page chapter"	✓ Can revisit content/ repetitively listen to lectures resulting in better absorption (UK_HUD_8 – "some lecturers may be a little bit faster and for some students may find it a little bit difficult") Negative- ✓ Cannot obtain instant feedback or ask questions ✓ Some interviewees argued it is hard to assess the effectiveness for students (SW_LUND_4,5,9)

	prioritising education over other activities and therefore is less effective.	✓ Flexibility (UK_HUD_2- "we can record the sessions and whenever we want we have time. It's not time restricted in terms of our calendar and it brings that flexibility") Negative aspects- ✓ there is no way to interfere with the material once it is published. For example, if students are struggling with a particular section of a pre-recorded lesson, you cannot change the way that it is explained, or use a different approach to teach it. If tutors do try to change the material depending on what the students need, they would be doing double the amount of work, demonstrating its ineffectiveness. ✓ it is difficult to keep asynchronous lesson content up to date. Tutors may be tempted to keep the same lessons year after year to reduce their workload. However, this can mean that the information is no longer up to date and is therefore less effective. ✓ Could be time-consuming (UK_HUD_5 – "requires a bit of more foresight and	

		planning. It's more difficult to be spontaneous")	
Online Flipped Class Rooms (FCRs)	Almost all the interviewees had some experience with flipped-online classrooms, with some individuals having only designed courses and some individuals have designed and taught courses in this way. However, the experience of Sweden interviewees for FCR was at a low level. All interviewees stated that this was a sensible method to use so that there is a mix of synchronous and asynchronous, with students able to learn the course material and then have a more interactive session. Individuals who had designed courses to be run in this way mentioned that it works best for small, motivated groups of students, but is less suitable for larger cohorts. Individuals who had taught courses in this were stated that it works well as long as all students have completed the pre-work. If students do not learn the material before the synchronous lesson, "you end up with a class in which some have done it and some haven't". FCR were an effective method for problem based/case-based teaching	Effective circumstances- ✓ Effective better than the above 2 approaches alone; for multiple types of students who have the only option to learn online ✓ effective for getting feedback for pre-recorded lectures (SW_LUND_8) ✓ effective when working with a small cohort, as students are likely to have completed the pre-work. However, with a larger cohort, the likelihood of students not having completed the pre-work increases. Positive aspects- ✓ Students attend the lectures with a basic understanding (if the asynchronously available supporting content is studied by students in advanced) ✓ Works both for pre-class and post-class activities ✓ enables you to kind of present and show different forms of data	Positive aspects- ✓ Flexibility to work through at their own paces ✓ If the asynchronously available supporting content is studied by students in advanced, they could then reflect on it and the taught content can be easily grasped and comprehended for a deeper understanding. (UK_HUD_9 – "effective because if they find particular problems or contexts particularly thought-provoking or stimulating, they can then do sort of self-directed learning around that they can kind of do the usual things looking on the Internet, YouTube, whatever sources they want to use and sort of do the bare minimum, but also come more prepared if they find it particular stimulating, particularly more stimulating for them.")

	classes. As DRR teaching is mostly associated with problem/ learning based learning, common practice of the educators is to introduce the students to case studies. problems, scenarios, etc. and let students work through them at their own pace leading to interactive sessions/ discussions with class (in the presence of the educator/tutor) (UK_HUD_9- "a lot of my teaching is problem-based learning or follows problem-based learning philosophies. And FCRs are really effective ways of introducing the problem, the context, the issues. Students can kind of work through those in their own time. And then when you come together for a kind of live interactive session, students can then start to work through some of the queries and start to think about some of the ways through that problem. So, students kind of effectively can turn up with a kind of understanding of the issues. They don't have to have that kind of rich deep kind of knowledge yet and then you can kind of communicate that through the live session.") Therefore, FCRs were common even later in combination with in-person, on-site sessions when teaching at university started to become normal. However, in	visualization, different forms of data presentation (UK_HUD_9- "if you have kind of online spaces where data can be shown in different ways, it can speak to different sorts of learning strategies and kind of preferences for students. And it just enables us to kind of present problems and present fairies in quite creative and different ways.") Negative aspects- ✓ initial workload	Negative aspects- ✓ In advance preparation/ work ✓ students may struggle during the live lessons if they do not attend the required prework; they may feel unable to ask any questions or inform the tutor that they do not understand the work because they have not prepared for the lesson as they should have.

	an entirely online setting, FCR was opted for by many interviewees considering the methodical combination of asynchronous and synchronous learning that prevents the problems each approach would give rise to when implemented in separation. However, as this involves self-learning and a lot of preparation in advance, it was more applicable for a professional/ postgraduates audience but only a few students were interested in the undergraduate groups (UK_HUD_6- "it could work if you had a very focused course and a very diligent group of students, but I think generally speaking students come to those flipped sessions and they haven't done the background prep that the lecturer anticipates.")		
Blended learning	Most of the experience with blended learning came from the post-emergency shift period. That was when the universities finally resumed face-to-face teaching after long months of disruptions. In most cases, blended learning was introduced as a means to help students or tutors who were sick or having Covid symptoms to attend lectures and seminars and facilitate them respectively. Thus, it tended to become more of a hybrid setting (SW_LU_2).	Effective circumstances- ✓ drop-in session to discuss students' problems/progress ✓ when space restrictions are there ✓ if students have only one lecture session on a particular day on campus it can be taken online ✓ when the module can be planned in advance to identify what aspects need	✓ holds the potential to diversify the learning process if courses are designed to be taught in a blended setting

	According to the experts, although lectures are conducted now in the university, they are also being recorded and uploaded to the university's Learning Management systems. Meanwhile, the tutors suggest students online self-directed learning pre and post-lecture sessions to enhance their learning experience. Therefore, blended learning in the current context included in-person lectures in classrooms together with recorded lectures and online learning activities. Overall, the educators have shown a positive response and had fairly positive experiences. There were also specific comments on the traits of this approach. For instance, SW_LU_4 pointed out the method's traits in terms of resource effectiveness. SW_LU_6 added the time element, arguing that in the online setting of the blended format exercises that tend to take too long are rarely performed while the ideal time frame is 10 minutes.	online sessions and what aspects need classroom sessions (in person) ✓ very useful for tutors who are well organised and have planned the sessions appropriately so that the best material that should be taught online is being taught online and the best material that should be taught in person is taught in person. Some interviewees argued for the ineffectiveness of the blended method, stating that the mode of teaching must be either fully online or fully in the classroom otherwise "we lose the students in the online setting", for instance, SW_LU_10. This indicates that the level of interaction is connected to the level of attention and focus of students.	
Massive Open Online Courses	With only a few exceptions, the participants have not had extensive experience with MOOCs. Yet most of them were aware of the concept and conduct. The only experience came from being on the students' side rather than	Effective circumstances- ✓ For very specific subject areas	✓ Advantageous for students who wish to learn specific areas/ specialise/build expertise. For instance, the findings from interviews in Japan specified that disaster teaching at the master

	designing or maintaining MOOCs. According to the experts, MOOCs work well for certain areas in DRR as they are not usually taught in common subjects. MOOCs are suitable for motivated students with a thorough understanding of what they want to learn, including the students that have not been selected to study their desired subject/ module for different reasons (UK_HUD_2- "Diploma level graduate level students where there may be a little bit of reluctance to get in here, engaged and involved"). According to the experts from Japan, there were incidents of discontinuation of MOOCs after running for 12-16 months due to the challenges of hefty license fees. Therefore, a financially viable platform needs to be available to facilitate such a mode of classes. Some experts interviewed by UCLan, see MOOCs as a threat to higher education because there would be no need for students to come to university if MOOCs were very successful.	✓ For well-experienced students who need further experience/qualification in a specific subject area ✓ For training courses	level has attracted students who do not travel (A relatively predominant presence of women from Central Asia was noted).

All the interviewees were familiar with online teaching in general. This in fact reiterates with the notion of Siemens & Matheos (2010) 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 (Bachri et al., 2021; Boelens et al., 2015).

In regards to the effectiveness of the above online approaches, experts argued in support of and opposed to each method, highlighting their effective applications (circumstances where the method can be effective). Concerning the experts' comments on the effectiveness of the above methods, one can argue that educators tend to project their perception of effectiveness, benefits, and drawbacks (benefits and drawbacks was a dipole respondent focused on mostly) on students and assume that they face similar challenges as they do with various modes of online teaching. Besides, the interviewees did not provide a solid definition or a solid 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 (2020), it might be quite early for a full assessment on the effectiveness on online education and the interviewees' lack of input towards a solid interpretation on effectiveness reiterates this stance.

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. 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), is referred to as online Flipped Class Rooms (FCRs) (Rehman & Fatima, 2021). Mostly their teaching is delivered (mainly) through lectures in combination with class room 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, UK_HUD_1 and UK_HUD_8 highlighted that sometimes online lectures could be much more effortless if it is 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 is a better understanding which could help them adapt the content or tailor material on the spot. This reiterates with the survey findings of Gaspar et al. (2020) that achieving interaction outside the physical classroom is significantly challenging.

All in all, findings regarding the current use of the listed 5 key online approaches and their effectiveness can be discussed through the key feature of those online approaches. This could help in identifying and analysing the use and effectiveness of online approaches beyond the above list. Therefore, below is a discussion of different attributes that helps reflect on the state of art DRR education.

Digital divide: the main hindrance to assuring equal access to online education

The COVID-19 pandemic compelled both the DRR tutors and the students to remain at home while seeking for accessing their educational platforms at their respective institutions. Many interviewees (including everyone interviewed by KEIO, Japan) reported that the issues related to internet connectivity as the main hindrance to ascertaining the success of any mode of online education. Adding to that the cost of data/ internet was very high in certain regions and there are incidents where the educators decided to support students financially to continue online education with a decent connection (for example; JP_KEIO_4). 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 (Irawan et al., 2020; Wargadinata et al., 2020). Further, the cost involved with access content has been a burden to the student in online learning (Simamora, 2020). This scenario contributes towards the digital divide that could be defined as the deprivation that people suffers without access to information which results in information gaps ultimately leading to the dehumanization of citizen's rights (Alvarez Jr, 2021; Watts, 2020). In this given context, the right to education of the learners are at a stake.

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 with the students tended 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 with the findings of Dwivedi et al. (2020) where it claims that 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 (Hall et.al, 2020), 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 helps the tutors be benefitted from a unique online element in the teaching. In this context lack of interaction is considered as a disadvantage on both synchronous and asynchronous learning even though Littlefield's (2018) has claimed that these learning styles have their own advantages and disadvantages.

Below Table 3.3 illustrates the summary of KEIO, Japan interviewee's discussion with JP_KEIO_10 regarding the pros and cons of online DRR education.

Table 3.3: Pros and cons of online education

Features	Positive factors	Negative factors
Possible to offer the courses regardless of the restrictions posed by the COVID-19 pandemic	Possible to continue regular classes and research seminars while observing stay-home recommendations	The socio-economic background of the students led to varying levels of the internet accessibility, resulting in creating disparities amongst the students regarding accessibility to course resources, actual attendance, and active online interactions
Bridging time zones and reaching many countries	Participation of students with different nationalities	Some classes happen at unearthly hours in your home country
Not required to come to the campus	Enhanced women's participation	Impossible to fully ascertain the actual participation of the students as some of them turn off their videos primarily due to connectivity issues
	Enhanced participation of many diverse nationalities	
	Enhanced participation of working professionals	
Affordable to take desired courses	More participation the students with limited financial means	Cost-effectiveness might override positive factors such as participation and contents
	Desired courses available at many affordable fees	
Effective dissemination of the courses with technological contents	Detailed explanations became possible on the part of the educators	Increased burden on the educators to prepare for the class

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 on digital accessibility and inclusion in learning (University of Bristol, 2021). One example from the VGTU 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 JP_KEIO_2 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 (JP_KEIO_9)
2) Enabling to listen to some first-hand case studies from the affected areas (JP_KEIO_9)
3) Giving an equally accessible platform to specially-abled students (JP_KEIO_2)
4) Ensuring a variety of viewpoints other than 'predominant' discourses (JP_KEIO_10)
5) Enabling rural people to continue their education (JP_KEIO_4)
6) Enabling women who are not encouraged to leave home for further studies to join professional online courses (JP_KEIO_10)

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, SW_LU_7 and SW_LU_11 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. SW_LU_10 argued that it goes beyond pedagogics and it is mostly a way of conserving resources in a resource-scarce environment in line with what SW_LU_4 also highlighted.

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. UK_HUD_2, UK_HUD_5 and UK_HUD_8 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 UK_HUD_10, the DRR learner should not be just a passive recipient of knowledge, she added "we cannot teach Disaster Risk Reduction as a sort of using you know 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, Experts including UK_HUD_2, UK_HUD_3, and UK_HUD_8, have also observed that students are reluctant to switch on cameras. This prevents the tutors to understand the student cohort and tailor the content. It has not been a pleasant experience for many tutors including UK_HUD_10 who 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, UK_HUD_11 brought an example of one of the aspects of DRR, that is emergency response courses/moduled. UK_HUD_11 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, UK_HUD_7 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, methodical planning of DRR modules should including 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 (Purnama et al., 2021). 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 in fact reiterate with the following resources recognized by the University of Bristol (2021) to focus more on digital accessibility and inclusion in learning:

- **Understanding accessibility**
    - Understanding accessibility
    - Hearing impairment
    - Mental health
    - Neurodiversity
    - Physical Impairment
    - Visual impairment
- **Accessible design:**
    - Accessible design
    - Text and Images
    - Video, Audio and Animations
    - Interactive materials and activities

- Synchronous sessions

- **Variety & Flexibility**
  - Low-bandwidth online teaching
- **Representation & unconscious bias**
  - Unconscious bias
  - Reflect diversity in your reading list
  - Implicit Bias, Stereotype Threat and Higher Ed by Russell McClain (YouTube, 11 mins)
  - 7 Steps to Mitigating Unconscious Bias in Teaching and Learning (PDF)
  - Multicultural Education Pavilion - Diversity, Equity, & Social Justice Education Resources
- **Inclusive Design**
  - Accessibility, Usability and Inclusion
  - Inclusive design principles (Word)
  - Inclusive writing guide
  - Inclusive learning and teaching in higher education: a synthesis of research
  - Inclusion guides for supporting students
  - Twincly: A playful way to think about accessibility and inclusivity in online teaching
  - Accessibility, inclusivity, universal design – notes from reading group
- **Inclusion Resources**
  - Staff Inclusion
  - Student Inclusion
  - Student Groups

Unique benefits of online education for DRR

- **Knowledge sharing among learners from different contexts and expanding exposure to experts**

UK_HUD_10 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". Supporting UK_HUD_10's argument .... added to the vitality of encouraging an interactive environment within the DRR learning environment. With online education,

resources are no longer limited to geographical contexts. As a result, knowledge sharing has been elevated by facilitating universities facilitating guest lectures from experts around the world. UK_HUD_10 commented "It's been great in terms of bringing guest speakers. So now every week I have a guest speaker. we can now talk to the experts who have written a paper, you know, writing a chapter, do something on the ground."

- **Presenting different forms of data visualisations/ presentation**

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. UK_HUD_9 explained this "if you have kind of online spaces where data can be shown in different ways, it can speak to different sorts of learning strategies and kind of preferences for students. And it just enables us to kind of present problems and present queries in quite creative and different ways."

- **Attending essential out-of-class activities/ engagements**

DRR student cohorts are diverse and that includes time-constrained working students. Learning at students' own pace is beneficial for working students. The interview findings indicate that sometimes the resources in terms of DRR education in all forms are minimal in disaster-prone/disaster-affected contexts. Therefore, boundaryless online education is beneficial for students from disaster-prone/disaster-affected contexts, especially in less privileged settings.

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 UK_HUD_3 stated "effectiveness might be higher if they are doing some sort of, let's say, computer software simulations or computer software demonstrations or something"

Identifying effective pedagogical approached for different student cohorts

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, UK_HUD_10 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) mostly suggested pedagogical approach was MOOCs. For instance, according to UK_HUD_3 "when they already have their PHD's 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 UK_HUD_6 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. UK_HUD_4 explained the idea "knowledge is available right on YouTube if you go to Google then it is available what they need from a teacher is beyond that". 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. UK_HUD_5 reasoned out "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 matured 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. Affirming this, UK_HUD_4 stated "when it comes to post graduate students, I think all of the methods are okay"

- **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 is the major connectivity, especially for those who are not living in urban areas. This was location specific and for students from rural areas, accessing the online platforms itself tuns out to be a challenge with their limited means of resources to afford laptops or good enough for them to attend their learning sessions through 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 (UK_HUD_3 and UK_HUD_4) 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. UK_HUD_3 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 UK_HUD_4 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, UK_HUD_2 stated "can study whenever and wherever they want" while UK_HUD_8 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.

What specific strategies or tools do you use to encourage an organic and interactive environment in your online sessions? (For example, Game-based teaching).

Online classes allow accommodating more learners compared to physical classes where managing space is challenging (Jena, 2020). Distant and online learning tools expand the access to education, a wider range of courses can be provided as a result of the scalability of online learning and personalization of education is easy (Mäkelä et al., 2020). Wider learning audiences indeed result in educators expanding their professional competence, exchange feedback and best practices, and enhance their career portfolios (Alman et al., 2012).

Possibly due to the greater association with the theoretical content, all the experts use different tools and strategies to encourage students to be interactive leading up to organic learning. Accordingly, the findings could be summarised into 16 tools and strategies namely, games (including quizzes), brainstorming and discussion sessions, question and answer sessions, roleplay, online voting, breakout rooms (in zoom) including problem-based activities, film method, web whiteboard, podcasts, Spotify challenge, and physical activities. These strategies were executed for different reasons by different experts. For instance, for some lecturers, questions and answer sessions were mere to check if the students are continuing to listen (UK_HUD_4 mentioned "in the online classes it is very hard to know whether students are they or just the device because we don't see them. So, it could be their device connected to my device. So then what I do is always ask questions or check whether like you go to the participants' names and check whether they are paying attention, especially in the undergraduate classes, or at least ask how they are and say some random things") and for some, it is to check if they are in a correct understanding of what was taught (for example, questions and answers through instant quizzes used by UK_HUD_2, UK_HUD_4, and UK_HUD_8). Hence the identified strategies and tools were classified into 2 categories based on their application, which includes strategies and tools that help students learn better or creatively improve their understanding of the subject/concepts/ theories, etc. and strategies and tools to make sessions organic and interactive. However, the strategies under creative communication of interpretations and concepts inevitably help the students to be engaged, for instance, brainstorming and discussions empower them to present their ideas and engage in classroom discussions actively. Some strategies like online quizzes were sometimes used to enhance the engagement rather than as a mode of communicating the teaching content (for example; JP_KEIO_2 and JP_KEIO_4. Table 3.4 summarise the findings of strategies and tools for interactive and organic online sessions.

Table 3.4: Strategies and tools for interactive and organic online sessions

Specific strategies employed in the online sessions	Remarks
Creative communication of interpretations and concepts application	
Games	The 2 types of games identified were online quizzes and video games. UK_HUD_7 has developed her own video game for ethics in DRR and expects to introduce her students to playing it to better understand the concepts. In UK_HUD_9's words "I recently developed an early stage of a video game for disaster ethics. And so, we are going to be playing that in class". Similarly, quizzes were used for several reasons. According to JP_KEIO_2 rather than questioning the understanding or knowledge of the students, such sessions are aimed to warm up the classrooms, a sort of rapporteur building; and as an icebreaking exercise (JP_KEIO_6). UK_UCLAN_1, UK_UCLAN_2, UK_UCLAN_3 and UK_UCLAN_5 too have used quizzes or polls to encourage interaction between students in an online class, although a variety of applications were used to do. Apps included Vivox, Quizlet, Padlet, Microsoft Forms, Slido and Kahoot.
Brainstorming sessions	Brainstorming sessions were conducted to encourage the students to critically think and promote the free flow of rich ideas in the presence of the lecturer. One example was where the educator suggests the students research something related to what they learned, before the class and present their findings leading up to a brainstorming session; in that case, we're finding case studies for certain theories– UK_HUD_1 mentioned: "I would ask them to search these theories and find, real-life examples for these theoretical ideas and come back and make a discussion". The findings students present to the class are usually self-searched. Brainstorming was commonly associated with problem-based teaching and UK_HUD_9 explained how he implemented the idea "I think the reason why we research what we research and we're interested in what we're interested in is that we're starting from a point of a problem and that those problems kind of exists on lots of different scales and different contexts and different places. And

	essentially, we're trying to find better or more effective ways of moving through that. And now I really think that without teaching, we can kind of follow a similar sort of process where we present a particular kind of hazard, a particular context or disaster or event, and immediately that throws up problems that even to someone without understanding, requires discussion, requires kind of critical reflection. So that idea of problem-based learning, I employ very specifically, but it flows through everything I research and everything I teach."
Short video sessions	In between the lecture, the tutor shows short videos regarding relevant cases of applying a concept/theory discussed in the online class, to ascertain the understanding of the students (JP_KEIO_4)
Film method	Films related to the subject contents are employed to make students better understand the ideas and concepts. UK_HUD_3 added "after each and every lecture we have uploaded a short film. We requested the student to watch the film and have a discussion before the beginning of the next lecture"
Word clouds	This is where the word clouds are created from the words that come from the audience/students. It allows them to relax, review and reflect on what they learned while highlighting the prominent words/terms. UK_HUD_10 described it as "..write one word you know so we end up creating word clouds so they can literally move away from the main screen right."
Nature-based sessions followed by questions	This is an innovative method where one online participant joins from a location (that becomes the topic of a nature-based session) and others participated with resources, followed by group calls for focused group discussion (JP_KEIO_8).
Chat tool (as used during lectures)	As a built-in tool in many platforms, chat tools helped students to communicate through texts and this was preferred by many students including those who appreciated anonymity in education. Educators claimed that the chat tool is excellent for encouraging students to ask questions or to let you know if they are not understanding things.

	UK_UCLAN_1 stated that the most important tool for encouraging an interactive environment is the chat function.
Role play	Understanding the stakeholders and perspectives is a crucial aspect of learning DRR, especially as it is more about learning someone else's experience which could be far away from the UK students' experience. UK_HUD_9 elaborated on the idea "I think one of the things about Disaster Risk Reduction sort of pedagogy and learning is that it requires you to sort of understand perspectives that might be or understand places that might be far away from your own experience. And a key part of that is you need to almost step into the shoes of others or step into other places, and in order to understand how to work through those particular problems. So rather than kind of speaking about that at a theoretical or conceptual level, I find it quite effective sometimes just to do small role-playing exercises where, it might sound a little bit cliché, but a student might be asked to be a local authority or a particular kind of DRR practitioner or an affected sort of citizen, or whoever. It might be just to try and sort of see the problem through their eyes. And I think that kind of can be a really valuable sort of learning experience as well. A similar idea was [resented by UK_HUD_1 "teaching the community engagement module and let's say community engagement in Disaster Risk Reduction and there are different stakeholders. So, we will ask students to act in different roles and we will open a discussion and we will give them a scenario and start discussing so they will get a very good idea about the community engagement in that sense."
Webwhiteboards	Webwhiteboards were used as a collaborative space to generate and share ideas in the class. UK_HUD_5 clarified his approach "where students can write comments and respond to each other's comments"
Podcasts	As an emerging trend in the higher education landscape, one of the interviewees employs Podcasts putting the generations' needs and preferences in the centre. Modern/undergraduate students generally have a shorter attention span and expect excitement/to be enticed, hence, Friday evening lectures are naturally their least favourite. UK_HUD_7 explained how she tackled the Friday evening lectures with podcasts as part of her teaching "In addition to

	the fact that why would they show up; you have to entice them. They're also Fridays, from 5:00 to 6:00 PM. I mean, that's hell for any student. So what tools do I use? I'm only doing podcasts. They like podcasts. There's not a lot of stress that they didn't understand something. Or maybe they're not going to have anything to say. It's like, watch this film and come and talk to me about it. It's very easy and there is lower expectation. And so, with that, 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."
Spotify challenge	UK_HUD_10 explained how creatively she used the Spotify (a music service) app to relate her teaching content with songs in a manner the students reflect on what they learned and refocus better. As per UK_HUD_10 " One of the things that I'm also trying to do this year and it worked really well last year, but it was kind of a pilot and we've been doing kind of the Spotify challenges. So, students have to choose a song on like a particular disaster issue, like a resilience definition of the partial index, for example, from SENDAI Framework for action with the lyric that would fit in certain target and then we would listen to the songs and discuss."
Keeping the students engaged	
Question and answer sessions (and the use of chat)	While this strategy helps tackle the boredom in the session, it also acts as a quick mechanism to keep students focused without much effort. Some lecturers added a humour element which they believed the students enjoyed in their classes. For instance, UK_HUD_10 added "I do quite a lot of chat activities, so there would be like answer this question in the chat. So, if they're listening, students would put something in the chat and just to spice it up a bit, we've been doing responses with gifts; for example, I would ask a question and see who kind of responds with the best gift to that particular question. And the real questions are serious like, how do you define disaster? Or we talk about a particular kind of context or a particular situation, so we then all vote on this gift. And it kind of gets students to laugh and then to just think slightly differently about everything that we're discussing"

Breakout sessions (including the breakout room feature on zoom)	Breakout sessions facilitated interactive group discussions/activities during the experts' lecture sessions. Below are some comments on the use of zoom breakout sessions; UK_HUD_5 "students can go away and have a discussion for maybe 20 minutes and then come back into plenary" UK_HUD_2 "kind of group discussions where students are sent in groups to different rooms to discuss something and then come back and report" Adding thoughts on the good practice; SW_LU_10 argued that the teacher being present in the breakout room during a student discussion is not as effective as in the physical classroom but rather creates a sense of awkwardness, disturbing the students and discouraging fruitful discussion as the teacher's presence on the screen adds an element of pressure. Other interviewees like SW_LU_4 and SW_LU_8 disagreed with this view and argued that a teacher visiting breakout rooms adds to the interactive setting of an online classroom, especially during online group work.
Online voting	Helps to collect students' opinions and ideas so that content can be organised accordingly. UK_HUD_10 stated, "So there is always voting. We kind of warm up with a bit of voting and I tend to mix interesting multiple-choice questions you know just to get students going". She mentioned the online tool she used "Vevox".
Padlets and Quizlets	These were very useful to provide insight into how well the learner understands the topic.
Physical activities	This includes small activities that help boost the energy levels of students or helps them to destress and refocus. UK_HUD_10 explained how she does that in her sessions "so I normally start every session with, it's like an energiser which has nothing to do with the session, but I literally ask students to stand up or, you know, do whatever they can instead of just sitting in front of the screen -for two minutes. We do a little exercise on, like balance, you know, so sometimes you sort of almost rub your tummy and then you have to do the same with your head and everybody goes in different directions. This sort of energizes. I do them in person as well. They just allow people to kind of almost distressed because

	everybody starts laughing. This is the natural reaction because nobody can do it properly. And everybody laughs at everybody and then we go into the session so students can refocus better."

The commonly used strategy in the above-listed strategies and tools were games and online quizzes, both of they created on their own and readily available and relatable to the subject area. As problem-based learning, understanding DRR stakeholders' experiences and perspectives, and active discussions formed a vital part of DRR modules/ courses, brainstorming discussions, and roleplays were equally popular. Experts used chat options, asked questions, and created (online voting) polls to check the active participation of their students in their lectures, hence question-and-answer techniques and online polls were relatively popular as well. The chat tool has been claimed as one of the key tools for educators teaching online, particularly for building an active, inclusive learning environment Doug Lemov (2020). The remaining tools including podcasts, Spotify challenge, word clouds, web whiteboards, film method and small physical activities were not repetitively mentioned in the interview findings. Table 3.5 depicts some special tools/ systems employed at the VGTU Department of Construction Management and Real Estate (they were created at the department).

Table 3.5 Special tools/ systems employed at the VGTU

The interactive environment in our online sessions	Description
Computer learning systems	The computer learning system is understood as an object (its composite parts) for managing and investigating data, information and expressed and unexpressed knowledge. It is a modelling system, which accumulates data and information from various resources and processes them by employing various mathematical, logical and informational models. It provides a learner with data and information needed for analyzing, forming and assessing possible decision-making alternatives and for deciding as well as obtaining and saving results. A computer learning system must permit a user to transform a huge amount of data and information from necessary informational publications for analyzing the resolutions of a problem and making decisions. Modelling of an object (its composite parts) by a computer learning system shows how an object or its composite parts that are under investigation change as their surrounding environment changes. A computer learning system permits simulating and visualizing of an object under investigation and its composite parts individually or in groups. Expressed and unexpressed information and practices accumulated by experts and users in some certain objective area are stored and developed on the bases of information from a computer learning system. These are employed for analyzing and modelling an object (its composite parts) under investigation. The results from the analysis by a computer learning system are submitted in digital, textual and graphic forms (schematics, graphs, diagrams) and as

	formulas, blueprint drawings, videotapes and other forms. More than 90 computer learning systems were developed.
Affective Tutoring Systems	The Affective Tutoring System integrates the self-assessment measurement of students with biometric (facial expressions analysis) and intelligent methodologies and technologies. All facial expressions require consideration to determine the learner's emotions and wishes. The Affective Tutoring System can analyze the facial expressions of a learner while he or she is learning a module. An analysis of the learner's facial expressions leads to better control over alternative sequences of the module. This system can consider the learner's emotions (happy, sad, angry, surprised, scared, disgusted and neutral) and make a real-time rational choice of learning materials. The analysis of a learner's facial expressions can indicate which learning materials the learner might prefer at the moment. The Affective Tutoring System has created a rational version of a learning process tailored to a specific student, considering such factors as how much the studies are interesting or difficult and the level of stress (with the help of biometric technologies). The Centre includes an automatic function that takes module topics and compiles an optimal set of personalised materials for a specific student. The Centre constantly changes the learning subject with regard to situational and individual interests and the most suitable learning style for a specific lecturer, learner and other stakeholders. The Centre includes an automatic function (by using the historical statistical data defining student individual interests (student's level of knowledge, student's learning style, student's levels of interest in learning and learning productivity) that takes module topics and compiles an optimal set of personalised materials for a specific student. Innovative assessments are often intended to motivate students to take more responsibility for their own learning, to make assessment an integral part of their learning experience, and to embed it in activities that stimulate students' abilities to create and apply a wide range of knowledge, rather than simply engaging in acts of memorization and basic skill development. In order to personalize the educational process and fulfil the requirements and needs of students, professors, and practitioners better, innovative Big Data Mining and the Affective Tutoring System were developed.
Multi-criterion intelligent decision support systems (INCLUDE IDSS)	INCLUDE IDSS are able to provide, in real-time, a multivariate design, multi-criteria analysis, and selection of the most rational INCLUDE alternatives. INCLUDE IDSS is also able to provide multi-criteria analyses of the INCLUDE alternatives by local authorities and operators to reduce the risks associated with various hazards. Furthermore, INCLUDE IDSS provide different and complex scenarios in real-time, which enables effective and informed decision-making that is based on adequate, available and trustworthy data.

Web and text mining	Web and text mining provide automatic, real-time INCLUDE subjects for blogs, online forums, social media (Facebook, Twitter, etc.), surveys, comments, opinions, notices, studies, papers, research, articles and reviews. Web and text mining can be used to understand and track citizens' opinions, thoughts, feelings, attitudes, emotions and preferences, and enable stakeholders to make better decisions.
Video neuroanalytics	Video neuro analytics ensure real-time arousal, valence, affective (boredom, interest and confusion) attitude, emotional (happy, sad, angry, surprised, scared, disgusted or a neutral state) and physiological (heart rate, breathing rate, average crowd facial temperature, crowd composition by gender and age groups) states (AFFECT) analytics during the INCLUDE alternatives analysis. Video neuroanalytics can perform INCLUDE alternatives analysis based on the AFFECT state of the viewer. Video neuroanalytics then use these assessments to provide different stakeholders with recommendations for enhancing the INCLUDE alternatives (analysis and assessment, remediation, prevention, preparedness, indications and warning at the pre-event stage, and mitigation, response and reconstitution at the event and post-event stage). This is followed by real-time mapping of the AFFECT states of the people present at INCLUDE sites. Using the maps as a reference, groups of stakeholders are then given tailored advice for making these sites more efficient.

Below content in this report summarise the analysis of some interview questions asked from the experts.

To what extent do the aforementioned online teaching strategies promote equal participation of different types of students, encourage different perspectives and appreciate their differences?

Are some strategies better than others?

It can be argued that most of the interviewees 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 the anonymity and if they imply it allows them to better engage, the interviewees looked for ways to understand the cohort through anonymous responses. However, it is vital to emphasize that this anonymity has resulted in a higher rate of cheating and plagiarism leading to questioning the students' academic integrity (Fuller & Yu, 2014). Presenting her concise post-structuralist views UK_HUD_7 argued "openness, conversation, and encouragement that everybody's position and argument is relevant" and that represented most of the views.

Below are some of the key themes to summarise the interview results.

- **Some ideas/ students asserted dominance**

One of the key observations by the educators was that some ideas/ students asserted dominance during open-flow discussions. UK_HUD_1 stated, "some students are really talkative, and they and their ideas are dominant". UK_HUD_8 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.

- **Resistance of some students to participate in discussions**

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. This was explained by UK_HUD_1 as "some students maybe from their cultural background, they are not very much into engaging engaged with the teachers and discuss things. So, in that sense, sometimes it's really hard to get their idea". UK_HUD_2 added a similar comment "sometimes people can be reluctant to engage if they are afraid of getting things wrong. If the audience is quite large. So, you may be reluctant, especially the students coming from different cultural backgrounds, and social backgrounds may feel that we see that in the high education sector". Another reason for less engagement and low responses from students' end is the language barrier and UK_HUD_4 described it as "Sometimes they might feel uncomfortable like they put on a spotlight if they're English is not good". Moreover, learners from different cultures have their own understanding or view on classroom behaviours. Hence sometimes students are hesitant to present opposing views to the educator and at times the students are in believe that the educator is always right. However, according to UK_HUD_10, the DRR educators have to learn from students' experiences and therefore give voice to all the students' matters. However, as per her culture influence the communication behaviour of students; she stated "The power of our appearance and how it culturally affects. Some students would keep on talking because culturally they're adapted to it. And others just wouldn't, because culturally, for them the teacher is right"

Remote learners, especially during covid, usually live with their families and hence responding as normal could be a challenge to them. UK_HUD_4 explained this "coming from different backgrounds and then they might be in their houses, they can't switch on the mic and talk". This situation is tougher if the student is a parent, especially a mother (or single mother). UK_HUD_8 described her experience with an aspect of online and distance learning as "mature female students get more responsibilities when there are children around. If the children are sick, they have no choice, but to stay home with their parents. This mainly comes from their mother, so that might be difficult. But if the mother could get to the class she is free of childcare, she can concentrate on that just that day". While the majority talked about the confidence of students to speak in the class, UK_HUD_9 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 way, in those sorts of situations, I think definitely there's a creative and performative confidence that has to come with learning in that way". UK_HUD_9 further explained the essential confidence the students should pose for self-learning "I certainly

think that it also requires a kind of confidence or skill in working through material individually kind of on your own with no sort of supervision or no kind of support in any way. That particular confidence and abilities and sometimes people don't even have the kind of safe and structured learning environments to enable them to do that." There were some incidents in that educators used unusual ways of getting students to interact; For instance, SW_LU_10 called on a random student from the participant list to respond to a question or reflect on a certain topic. However, it was also stressed that this method of forcing interaction comes with deficiencies, one of them being disturbing the group of students and causing anxiety and frustration. SW_LU_2 also thought about using this method, however, argued that it is more effective in an informal setting in the physical classroom and not in a synchronous online where the element of informality is lost.

- **Digital divide**

Inequality in student access to digital learning resources, technology or devises 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). UK_HUD_10 explained how poor, interrupted and slow internet connection and network downtime affected the online activities resulting in students' failure to fully attend the anticipated learning experience "If your Internet is slow, that is the end, right? and then you cannot catch up. If your mobile phone doesn't work, you cannot participate in a vote. And again, you are kind of missing out on the activity. So, in that sense, there have been a lot of problems particularly when I had to teach students who are located in all sorts of places". UK_HUD_10 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 talking about global south here. You know, just 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 Internet like in the middle of Florida, right where normally she would have a connection and that was it. So, she sorts of 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, UK_HUD_3 stated " unfortunately if they don't have a good connection they can't follow. So always they 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.

- **Activities that could be ineffectual to promote critical thinking and problem-solving skills**

The educators usually decide on the in-class activities considering the students' learning outcomes and they would aim to promote a set of skills and abilities through a certain activity. In light of this, sometimes the educators use multiple choice questions or alternative decisions so that students could reflect on what they learned/ know and navigate difficult decisions and select the most suitable out of the alternatives. However, there is also a likelihood that multiple choice questions manipulate the respondent (student) to answer in a certain way which results in hindrance in critical thinking in them. Regardless of the well-thought-out alternatives (multiple choices), the educators set out, that could help improve critical thinking

while making decisions, students may just make quick or baseless decisions and still arrive at a correct answer. UK_HUD_11, the only interviewee who mentioned this fact, explained this scenario "Kahoot, etcetera. I think you are kind of really challenging the imagination. To me, it could be hit and miss type of strategy as well for students and therefore you are not sure 100% whether they're learning or not. So, if you tell them, for example, would you build a house in a flood the plane area? Do you have to count areas, and know the return period of floods? Would you do it all? .. perhaps they don't really think of it carefully".

- **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. UK_HUD_11 stated, "It depends on how the lecturers deal with their students". Stating a supporting view UK_HUD_7 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, UK_HUD_9 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 to promote equal participation of students mentioned some of their good practice. According to 111, "You get students with visual impairments, non-native speakers. There's so many things that we got to be careful of, even font size and font colour, use of complex languages..". UK_HUD_7 who strongly believe that educator has a lot to contribute in 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."

UK_HUD_7 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."

UK_HUD_3 as 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 document 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 presents largely 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. Therefore, openness is a key attribute to be practised from the initial days and UK_HUD_7 presented her views on a healthy educator-learner relationship as "Presenting her concise post-structuralist views UK_HUD_7 argued, "So openness, conversation, and encouragement that everybody's position and argument is relevant."

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 to teach 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. UK_HUD_3 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 uploads 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.

- **Active participation through Chat Box and other anonymous modes**

Educators' views are divided regarding the anonymity of students to provide answers UK_HUD_1 explained her strategy to encourage quiet students/ introverts to have a voice "if I have a small classroom, we can't really do it for the large classroom; Let's say if I have 50 students, I can't give the opportunity to each student to talk. But let's say if it's 10 to 15 small classrooms, I always try to. Sometimes I even name the student, then get their feedback on the particular scenario on a particular topic. sometimes give I specific time to every student-two minutes each student". However, standing on the opposite end, UK_HUD_2 mentioned his strategy as "However, if we notice this, what we do is that we don't identify students by name. So, it's anonymous and strategies which kind of prompt anonymous responses and give that topicality seems to promote better engagement". A similar approach was undertaken by UK_HUD_9 and she described it as "Whereas in the chat, vote and word cloud have really encouraged students to voice what they think and it's particularly working with like anonymous voting that we get such diversity of perspectives and it's been fantastic in that sense. So, I try and anonymise these different exercises because really, I don't need to know the name of the student. It is more for them to think through what they think and see all the other options. So, in that sense, equal participation has been much better." A similar idea was expressed by UK_HUD_4 "the best possible scenario would be in order to overcome that by providing them with a Kahoot quiz or a link to provide their feedback or asking them to chat. Put the answers into the chat box". Since the students were asked to freely chat while the session was on, they got quite enthused to comment in the chat box whenever they felt like it. According to JP_KEIO_2, while most of the time the students were allowed to turn off the videos, they could show their active participation by chatting profusely, which actually created highly interactive sessions. A study conducted by Davidson (2020) clam

that amidst the many challenges were some cases where the students enjoyed online learning especially when the interaction was high and the learning became more familiar and comfortable, for instance, the online chat facility.

- **Making peers aware of students in need**

There was one incident in interview results collected by KEIO, Japan where the colleagues of a specially-abled student were made aware of the possible corporative actions in dealing with that student. According to JP_KEIO_2, their approach involved informing all the students to cooperate with the class to make the participation of specially-abled classmates possible. Consequently, the students voluntarily came up with some better solutions which are not possibly envisaged by the tutor. This allowed the students to make the class hours workable for the specially-abled classmates with lots of care and concern. Through online sessions, such care and concern prompted the students to co-ordinate amongst themselves to make it possible to accommodate the specially-abled classmates. This has become an inspiration for the institution where the tutor works to give due consideration to ensure the participation of specially-abled students.

Learning Management System (LMS) is a platform that enables assembling and using online courses (or online components of courses) and contains eLearning tools accessible through a shared administrative interface.

What type of LMS is used at your institution/on your DRR-related courses/modules?

Different universities use different LMSs and below are the LMSs that the interviewees use/ have experienced in their DRR-related teaching;

Canvas

Moodle

Blackboard

Brightspace

Learn (an in-house LMS)

KEATS (an in-house LMS)

Google classroom

What functionalities or features within the LMS have you used in your courses? To what extent did those functionalities or features enhance/improve the learning experience?

It can be observed that the interviewees use common features including video conferencing, recording lectures, assignments (and marking) and feedback. There are some other atypical features and functionalities the interviewees mentioned. Table 3.6 map the features quoted by the interviewees as functionalities within the LMS against their purpose/outcome/learning experience.

Table 3.6: Features quoted by the interviewees as functionalities within the LMS

Features used	Purpose/Outcome/Learning experience
Video conferencing (online teaching delivery) in LMS with Zoom LMS integration	For teaching, online conference
Video conferencing (online teaching delivery) in LMS with Microsoft Teams LMS integration	
Video conferencing (online teaching delivery) in LMS with their own Video conferencing (online teaching delivery) in LMS with	
Lecture recording and live streaming (during onsite lectures)	Session recording (to be uploaded at a preferred time: ex Lecture capture/ with Panopto), live session recording which automatically is uploaded and live streaming of Onsight sessions (for use at any time)
Uploading reading material and further references	UK_HUD_3 stated, "we upload all the reading materials and upload the documentaries". An important feature here is that it is just one click away from the reading material which is faster and easier for students than them searching for the correct material for longer periods.UK_HUD_5 added "reading lists can be quite bespoke to the lectures there" and "before Keats existed I would have had like an online downloadable description for each lecture session with those readings identified and a link through to the library. But the student would have to, you know, do some work to get that material. So now they're just going to click on the PDF and it's there."
Assignments	Students can upload assignments. This includes quizzes which can be embedded with a graded scoring mechanism. UK_UCLAN_6 mentioned that assignments can be anonymised through Blackboard, which is important to ensure that assignments are marked fairly. This interviewee also stated that formative assignments can also be set on Blackboard, to monitor the progress of students without affecting their overall grade, and the assignment and progress can also be discussed over Blackboard

Dissemination	Another popular use for LMS, especially in UCLAN (Blackboard) was to disseminate a reading list for a course, additional documentation or interesting videos about a course or lecture, as well as upload the lecture slides for students to view after a lecture has been delivered. In essence, it is used as a repository for different information about lectures or courses. UK_UCLAN_2 stated that they try to ensure that course information is up to date in regard to current research, and such information is shared through Blackboard to ensure that the learning experience is effective for students.
Organising	LMS with the right use helps tutors as well as students with content management, particularly to organise their learning/ teaching materials. For instance, folders can be created on Blackboard, containing all information that is important for a specific assignment or topic, including tutorials or lectures.
Grading the students	For assessment descriptions for the students UK_HUD_1 mentioned the use of a Turnitin to safeguard academic integrity while making the grading process faster and easier, "through the Turnitin, we can give detailed feedback to them"
Feedback	Allows students to receive feedback for their submissions Also, students can provide feedback to lectures and later see how the lecturers responded. UK_HUD_5 explained "I've used an end-of-module feedback and that accumulates over time and students can see that feedback to the module and how I've responded to it"
Announcements	Allows sending messages to the whole cohort at once
Chat Box	The students are invited to comment directly Questions during the online sessions for clarification Sharing the links to reference materials, literature, and videos Sharing information about lectures
Ask the module leader	Where the students direct the questions to the right person and the system keeps chasing the module leader until they are answered. UK_HUD_11 compared this to students emailing the module leader who may miss the emails "at some stage you get very busy etcetera and you get disconnected with the system but actually, the system will chase you"
Discussion function	Similar to the above, this is an interactive tool that allows for more direct communication between teachers and students as well as between students, which is helpful especially for coordinating group work.

Groups	Involves similar features as above and names differently in different LMSs. By creating groups, the students can work together, especially for group assignments.
Peer-review function	SW_LU_2 and SW_LU_8 highlighted this function in CANVAS which is used to encourage students to provide feedback to each other on assignments such as individual reflections on a course module and reports. At the same time, this creates an interactive setting for students.
Journals	Students can keep a record in form of a journal of their work
Setting visibility criteria for successive activities by the tutor	UK_HUD_2 added, "we can set a condition for appearance, so the next task or next resource will only appear if a certain condition is satisfied." In other words, the next step is visible/available once the student completes the task as set in criteria by the educator
Calendar	Mainly it gives the students an idea of the upcoming events and therefore is helpful for planning. UK_HUD_7 stated, "I use the calendar to show them events that are going to be upcoming". According to UK_UCLAN_6 Blackboard is linked to each student's calendar, so assignment deadlines are added automatically, which was very helpful.
Transcriptions of the lecture	Sometimes helps the students to understand the lecture better, helps with making notes and is especially beneficial for students with hearing issues. However, if the speaker's/educator's accent is non-native to the transcribed language there can be confusion. For instance, UK_HUD_10 mentioned, "we could use transcriptions, although personally I always turned off because the transcription doesn't really pick up my accent."
LMSs with mobile applications	Increased accessibility
Track and trace	The teacher can get an idea about the students' submissions, activities and overall engagements (number of visits/views). UK_HUD_4 added "In Moodle, we can track and monitor who is doing what, and when they have submitted the late submissions and everything we can track. So, it is quite helpful. "This allows teachers to guide students better.
Collating important information	LMS is also very convenient as it collates all of the important information about a course or about the university in one place. UK_UCLAN_1 shared that "contact details for staff are displayed on Blackboard so that students are able to ask for help when needed."
Links to the University library	UK_UCLAN_5 stated that Blackboard links to the UCLan Library and platform are necessary for completing assignments.

HP5 Tool in Moodle	It lets creating and sharing rich, HTML5 interactive content, such as videos, quizzes, games and presentations more easily– for learning activities, enrichment, recall testing and gamification
Plagiarism Checker	A plagiarism checker could help students self-check their writings before submitting them for assessment for both draft submission and final submission.

While the commonly used features in LMS were familiar to educators, in general, the quiz function was not widely used. However, it holds future potential, also in the context of online examinations. Instead, the educators use other external sites and platforms for quizzes. For instance, UK_HUD_9 mentioned his experience with the use of Padlets "I quite frequently embed pad lets into my kind of learning environments as a way of sort of fostering both feedback and kind of interaction between students". UK_HUD_10 mentioned that she employs online tools like Padlet, Jamboard and Miro as online collaborative learning platforms. UK_HUD_7 also mentioned the effective use of interchangeable software that works in collaboration with the LMS; she added her experience "I like different recording software. I think it's more manageable on my part and it also uploads into MP4 files as opposed to being something that students have to log in and download and all of that. I think the functionality of things like Screencast-o-Matic is much better and it works interchangeably with Blackboard". Some educators were keen on Google classrooms and they admitted that it is much easier. All the reference materials can be saved. However, some could not use Google classrooms as Google usage is not allowed in their home country. Similarly, JP_KEIO_2 identified Webex/Zoom plus Slack (Messaging Programme) as a valuable tool to use in case the LMS stops working. Similar to Zoom, Ms Team, there is a Chinese platform called Voov Meeting which the tutors from China (interviewed by KEIO, Japan) used. There were also incidents where LMS was found not particularly useful for encouraging interaction between students (for instance Blackboard as UCLAN interviewees admitted); Teams was used for this function instead. During a lecture, Teams was used by UK_UCLAN_1 to encourage discussions between students about the lecture topic as well as asking questions to each other and the lecturer. Teams are also used to schedule meetings with students and other colleagues, as well as scheduling online classes. Furthermore, Teams lectures can be recorded, and the file later shared so that students are able to re-watch the lecture or watch it another time if they are unavailable during the scheduled lecture time.

Benefits

The benefits of LMS as perceived by the interviewees to improve learning experiences can be summarized as shown in Table 3.7.

Table 3.7: Benefits of LMS for improved learning experiences

Before the class	During the class	After the class
The recordings can be revisited as many as times the students want.		
Detailed feedback on assignments can be obtained. UK_HUD_1 stated "we can give very detailed feedback to each and every section of the assignment and if they have any further queries, we arrange online meetings and discuss them"		
Peer exchange through group works in collaborative spaces		
Greater accessibility through the mobile application helps create a sense of belongingness		
Reachability and faster responses from the lecturer to students' queries		
The content of the class available to the students		
The materials that complement the lecture could be available		
The organisation of content, learning/ teaching material and overall work		
Keeping records and notes		
Communication threads avoid sending multiple emails to different students who are struggling with the same problems		
Get notified through announcements and work planning with the use of a calendar Presenting the views on communication in general, UK_UCLAN_1 stated Interviewee 1 stated that communicating via a thread on Teams or Blackboard was more "organic" than sending an email, and another benefit of this is that other students are able to join the conversation if they are interested in the topic.	Live streaming allows students with mobilisation issues to get a similar learning experience The discussion board helps interactions during the sessions	Students if unable to attend the class can listen to the recording A dialogue beyond the classroom is possible. Giving and receiving feedback and follow-up on how feedback is being addressed

What difficulties or limitations have you encountered when using these functions or features?

As a whole, the interviewees found only fewer limitations with the functions or features they used in the LMSs. It can be noticed that there is a common set of functions and features in the LMSs the educators used. It was only a few interviewees used unpopular features in the LMSs or integrated/built-in features in the LMSs. Many agreed that the features and functionalities in the LMSs are not used to their full potential. For instance, UK_HUD_2 mentioned, "sometimes the most effective, efficient or effective options you may not even have heard of or don't know, because there are so many things." UK_HUD_4 remarked a similar observation "we do not utilise everything they are a lot to explore". Similar comments were made by SW_LU_2, SW_LU_8 and SW_LU_9. However, UK_HUD_9 highlighted how user-unfriendly the system becomes for explorations "I think the system is set up to embed in and kind of hold and host some forms or some things. But as soon as you want to do something slightly unusual it can become really difficult".

The educators further highlighted the lack of engagement of students to reap a rich harvest with the effective use of LMSs. For instance, UK_HUD_2 stated, "Sometimes it doesn't matter how much we try to encourage engagement. If the students are not up to it, they don't embrace that, so that that's a limitation anyway". Another similar observation from UK_HUD_5 includes "I think the main possibility that comes from these platforms are things like the ability of students to chat to each other or answer their own questions. That sort of peer-to-peer exchange, but I don't see students using those functions." UK_HUD_6 added, "the vast majority when you look at the analytics, didn't look at them recordings".

The reasons for the limited use and difficulties the educators encountered when using different functions and features are explained below.

Difficulties

- **The complexity of the system:** Understandably during the initial stages of use, any system can be challenging for educators, especially for those who are not very tech-savvy. UK_HUD_6 stated "The biggest problem there is it is very complicated, it took a lot of time to learn how to use the various functions". Adding to the existing complexities the systems tend to continuously change and educators find it difficult to sometimes adapt. For instance, UK_HUD_2 added "systems keep changing as well, so sometimes even for the teachers or the tutors it's not easy to keep on top of all the changes and all the options available." A similar comment was received from UK_UCLAN_ 6 who felt less positively about the LMS as it is "not necessarily very user friendly, so they can be a little bit clunky and difficult to set up". However, they also mentioned that it does become easier once you are used to it, despite being "a little time-consuming". Other interviewees from UCLAN also had difficulty with the time taken to complete tasks using Blackboard. UK_UCLAN_ 5 stated that it can take a long time to upload an image, and it is not possible to upload multiple files at the same time, while UK_UCLAN_ 2 felt that "it gets very slow" when trying to use Blackboard with a weak internet connection. As well as finding Blackboard slow, UK_UCLAN_ 2 also stated that some of the software in the LMS is limited to a certain area around the university, even though it is supported to be available to the whole of the United Kingdom, including the application Horizon as an example.

- **Use of only limited features and functionalities**: There were many remarks regarding the LMSs not being used to their full potential. According to UK_HUD_2, "sometimes the most effective, efficient or effective options you may not even have heard of or don't know, because there are so many things." UK_HUD_9 thinks it is the decision maker's responsibility to incorporate as many as possible efficient features and functionalities into the system. She added "limitations are mainly about how organizations using it as they may be using it, they have got a lot of features but it depends on what features your organization are installing"

- **Lecture live streaming not capturing the student activities:** Although the audio and video system within the class is essentially connected to the streaming the audio and video capturing devices are still and focused so that they usually covered only one range/angle. UK_HUD_1 explained this limitation as "let's say within the class we have a group activity and the lecture capture is not always effective to capture everything we discussed, because the camera is fixed to a particular corner and mic is fixed to one corner, so the group activities are all not always captured very well in these lecture captures"

- **Distracting real-time responses:** There were incidents where the educators found the class distracted by a comment or activity on the live chat while the lecture is going on. She explained her experience "I also find them perhaps a little bit too clunky and occasionally a little bit too much when you know all of a sudden everybody starts liking a comment or disliking the comment... And I just feel that sometimes students get a little bit distracted by it and sort of go off on a tangent. Yeah, so they do enhance learning, but they can be a great tool for distraction as well."

- **Difficulties in uploading files/recordings/supplementary teaching material:** This has become a prominent problem for the 2 educators from Sri Lanka where there are many signal-related issues. UK_HUD_3 explained "we had an issue with regard to the size of some of the documentaries. So, what we did was, we uploaded them into Google Drive and then shared the link with the student." Apart from that, the LMSs had a limitation for the file size. UK_HUD_3 mentioned his experience when an assignment was given to upload a documentary "size is not sufficient for them to upload the whole documentary."

- **Poor internet connection:** LMSs become futile without a proper internet connection. Apart from the uploading problems, the general use will not be up to the anticipated standards without a decent internet connection. UK_HUD_10 explained this scenario "if we need to upload the file but the Internet isn't fast enough, then that's a problem. If you're connecting from a mobile device, navigate in many of these functions like chat and adding something to the chat or even reacting becomes a nightmare because you end up kind of scrolling through multiple screens." UK_HUD_3 explained his experience during an assignment "They have been given MCQ-type questions but there was a criticism from the students' end because they didn't have a good connection, so it's very difficult for them to complete it."

- **Technical issues:** Disappointing situations encountered by the interviewees as a result of technical failures can be summarised by UK_HUD_2's comment "Sometimes they don't always work the way they're supposed to, so kind of technical issues" and UK_HUD_9's comment "as the interfaces tend to, I guess to be made with particular functionalities in mind. So as soon as you want to do or embed or import something that isn't what Interface is designed to do it becomes really clunky, difficult or impossible." UK_HUD_9 further justified his statement by bringing an example "when trying to present data and show data in different ways, as they're often; you're just required to link to resources that are outside of the interface itself. So, you're essentially asking students to move from a learning interface or a learning system out into a website, click back into the system to understand what to do, and just move back and forward between things". SW_LU_5 also touched upon the security issues that underlie using external software such as Mentimeter or Kahoot. A shift of platforms is not always recommended by certain organisations. There is always a threat to the e-learners for their information getting into the wrong hands and digital devices getting hacked, especially, without strong software and programmes to prevent, detect, and remove malware (Jena, 2020). There is also a chance of misusing online learner's personal information posing a risk to the user's data security (Simamora, 2020).

Adding similar thoughts on improvements to technical aspects in the LMSs, Sweden educators highlighted the function of "student-mode", through which teachers can visualize how the students see a course page. This was helpful but there were a lot of questions from students on the whereabouts of information available on the page. This might indicate that there is room for improvement when it comes to the accessibility of course information.

- **Design issues in the user interface:** For a tech-savvy generation who are familiar with well-designed user interfaces in social media, a poorly designed user interface can become a reason to stay away from using LMS. UK_HUD_9 explained this "A really small point, perhaps, but actually, I think has a big impact on student engagement is that the user interface is often just poor and clunky. It's not particularly pretty or attractive, and that sounds mundane, but for students who are familiar with working through Social media, with kind of polished, obvious sort of interfaces, things that they recognize that I think when it comes to things like Moodle, it looks dated. It looks clunky. They're actually having to learn how to navigate systems in ways that aren't familiar to them. So, it feels and I've had many kinds of students sort of comment on this that it feels like they're learning on computers in the 1980s just based on the style and the kind of format of the interface itself".

- **The authenticity of digitally submitted assignments of the students:** The tutors have no way to ascertain whether the assigned tasks for the students were really diligently and honestly performed as instructed by the students themselves, not cheating or asking their friends to help them out. This perception is also related to the fact that many of the students turned their videos off and remained invisible while they are participating online.

- **Dialogue beyond the classroom increased the time to engage with the students:** Since the timeframe of access to the online classes has become much longer, not limiting it to the class hours only, questions and clarifications by the students come outside of the class hours, too. This exceeds the formal commitments of tutors and could be a burden at times.

Furthermore, interviewees from VGTU have commented on the challenges related to other platforms that educators prefer to employ along LMSs. They are as follows;

- HP5 tool can be used only via Moodle system;
- Miro tool (free version is good enough, but sometimes not working properly);
- Free Mentimeter version is very limited: not possible to add the pictures, not possible to create the final version of the work (like pdf or other formats);
- Kahoot free version is limited for the number of questions that can be created;
- Padlet allows creating only 3 sessions for free.

3.3. Effectiveness of online, distance education for DRR

a) How effective is online and distance learning education for DRR and related subjects?

In answering this question, some interviewees initially began by stating that they do not really distinguish a difference between DRR and other topics that are taught in a digital environment; suggesting that the comments made in section 2 can be applied to this question. In interpreting the effectiveness of online and distance DRR education, the majority of the experts compared the online setting with the onsite setting. For instance, UK_UCLAN_1 is interpreted effectively to mean "can I teach the same things as I would in a face-to-face session". They made comments accordingly, for instance, UK_UCLAN_6 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. However, 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, SW_LU_6 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. SW_LU_3 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, SW_LU_3 highlights the reduced environmental impacts because of the switch to an online setting and the aspect of resource-efficiency. a survey was done by Gaspar et al. (2020) on remote learning in the time of COVID-19 concluded, it has been observed that engagement is a challenge outside the classroom. While most of the DRR community working in the field (Torani et al., 2019), engagement outside the classroom can be a challenge and concerns should be raised on the access for flexible learning while safeguarding the inclusive nature of learning opportunities. According to Noh et al. (2020), 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 outbreak to technical and vocational education and training systems and workplaces, affected apprenticeship schemes and work-based learning modes significantly (United Nations, 2020). In this context, the efforts made by the educators seem commendable.

According to some experts, the effectiveness of online and distance DRR education depends on the learner group. UK_HUD_1 explained this "with COVID we have experience now; the online and distance learning is very much effective for certain sessions and for certain student cohorts". 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 in 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. UK_HUD_8 described this group as "The actual people who

would want to learn DRR". UK_UCLAN_5 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 consist of working students or experienced students (professionals). Commenting on the effectiveness of online and distance DRR learning for professional students UK_HUD_5 stated "Great for professional development courses where there's some general stuff, perhaps about organising interdepartmental collaborations or thinking about a particular risk assessment methodology". To compare and contrast, the other group depicts the undergraduates who perhaps learning 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. UK_HUD_4 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, UK_HUD_1 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 amongst undergraduates who find online and distance education effective especially due to the anonymity and flexibility. UK_HUD_7 explained this scenario "sometimes students like online learning because they don't have the stress of going to class, commuting, all the transportation time and also that they don't have to sit amongst their peers and ask questions. They can just type something and that anonymity is quite helpful, especially if students get overwhelmed by face-to-face contact."

Online and distance DRR is especially effective for learners from all parts of the world including learners from exposed or vulnerable communities. As per UK_HUD_1 "I think it's very effective to have this online and distance learning because let's say if we have designed a course from UK and students from Indonesia, Thailand and Sri Lanka, also can engage with this DRR course". In fact, UK_HUD_6 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. UK_HUD_9 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.

Summarising a popular view, SW_LU_10 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. SW_LU_10 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, UK_UCLAN_ 4 too mentioned that online learning is a good backup, and is needed as a backup but should not be the main form of teaching.

b) For educators and students, what are the benefits of online/distance learning education when compared to more traditional, face-to-face education?

BENEFITS FOR THE STUDENTS

- Students from different parts of the world can learn the DRR course/programme they prefer even if it is offered by an institute located in a country they could not travel to (UK_HUD_11 explained it could be "More expensive to come to study at any university")
- Students can connect to and learn about far-away people, places and contexts. They benefit from learning from a wider, more diverse range of speakers through online means. SW_LU_7 too indicated the diversity of learning aspects offered by online DRR education.
- A flexible option, especially for working students (DRR professionals). Students benefit from completing the course at a time which is more suitable for them, with UK_UCLAN_1 finding that students can fit the course around their day. Also, UK_UCLAN_5 stated that having more control over the time in which a lesson should be completed meant that students can pause the video if they do not have time to complete it in one sitting or replay parts of the video that are more difficult to understand.
- Saves time and cost (UK_HUD_2 explained this as "cost of living is increasing all over the world. So, if you don't have to travel, you know you're saving money and students then don't have to invest in university accommodation or they don't have move out of their homes. .. So, it's it saves money.")
- Anonymity and increased responses (JP_KEIO_2)
- Responding through chatting (texting) other than talking (UK_HUD_7 stated "they can just type something and that anonymity is quite helpful, especially if students get overwhelmed by face-to-face contact.")
- Connectivity and interactions (UK_HUD_9 explained this as "it enables them to speak with and communicate with people and other contacts who bring other skills and knowledge and backgrounds to the Disaster Risk Reduction world so it enables those kinds of interactions that my students wouldn't normally have.")
- Allows students to better imagine and have an embedded experience of what they learn through DRR (UK_HUD_9 explained this "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 to embed 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",)

A study by Tartavulea et al. (2020) carried out investigating the effectiveness of online education concluded that the success of online learning largely depends on the trust the learners' place on the system and their technological readiness. For instance, even if the Covid 19 pandemic forced many students to urgently accept some online tools, the effectiveness of the whole learning differs student's confidence in the online system to function towards its intended objectives. The network is important in the learning process as much as the hard work the students put in by themselves. Similarly, successful online learning is achieved with peer support or collaboration (Arsyam et al., 2020). Few recommendations suggested in a study conducted by He et al. (2020), include, investing in communication, accounting for an adjustment period to decrease barriers, setting boundaries to avoid issues with work-life balance, being flexible to accommodate different starting points, learning curves, and preferences, engaging in quality interactive time, etc.

BENEFITS FOR THE EXPERTS

- The online environment allows educators to explore and practice different teaching techniques that could help them build a positive connection with different types of students, especially the students who are overwhelmed by meeting people in person or the students who perform better in an anonymous learning environment. This would help them to appreciate and respect differences in students as well as improve innovative pedagogical skills in them. For instance, UK_HUD_3 mentioned, "we can also use different techniques and methods".
- With the presence of students from all over the world with unique disaster knowledge, experience, and ideas a rich learning environment is naturally created. UK_HUD_6 explained it as the "ability to reach out internationally and have a really rich learning environment with students from all sorts of geographies and social positions". It indeed becomes a pleasant experience for educators.
- Help educators to better teach (and present) with the use of different online teaching materials. This includes the resources like videos, podcasts, documentaries, etc. as well as data visualisation methods and representations. UK_HUD_9 explained this as "present data in a variety of different ways and to cater the different learning styles, learning needs and learning plans."

A comprehensive summary study done by Albrahim (2020) listed out and categories the special skills and competencies that the online educators/ teachers should sharpen as pedagogical skills, design skills, content skills, technological skills, social and communication skills, and management and institutional skills. It is equally important for educators to self-evaluate their competencies to identify their own training/ learning needs (Baran et al., 2013). Online teaching competencies may serve as a protocol to certify the instructors' qualification as well as readiness to work in the online learning environment, which may use by the administrators to ensure quality (Albrahim, 2020). According to Palloff and Pratt (2013), being educated and well aware of the basic administrative, technical, and pedagogical aspects of online education is important regardless of the stakeholder group anyone represents in the online education sector.

c) For educators and students, what are the limitations?

LIMITATIONS FOR THE STUDENTS

- What happens in a classroom is non-linear and classroom dynamics largely contribute to the success of teaching as well as learning. Many of the experts highlighted that online teaching is not the same as onsite teaching without being able to the immediate observations and responses they usually make during live lectures. Similarly, the presence of students and students learning by watching students does not happen to a satisfactory level in online lectures. Some lecturers raised their concern over the students' learning experience without having to interact in person, learn from each other's and overall miss the factors that physical presence influences on how the learning come about. UK_HUD_2 explained this "If students are in the classroom, there are certain dynamics. Sometimes, if the cohort is quite good, it triumphs over another, the other students will get pushed by when there are some very keen students; except those kinds of things we don't get in online distance learning kind of an environment". Adding a similar opinion on another aspect of interactions UK_HUD_6 mentioned, "You miss out a bit on the relationship with the teaching staff who similarly will be part of a network going forward". A similar comment was made by UK_UCLAN_5 who highlighted the possibility of younger students losing communication with their peers, which is important for their life and career development. UK_UCLAN_6 stated that young students who are trying to develop their life and career may need "some kind of human help at that point" and online learning will not solve a lot of problems as it can cause students to "lose the essence of communication among other people".

- Challenges for linguistically diverse students: Students' illiteracy in certain languages refrain them from DRR courses taught in that language. The same applies to the Online DRR courses/programmes taught in English and they can be quite challenging for non-native English speakers or students whose English is not the primary language. This usually becomes a prominent case in vulnerable countries, especially in the global south and Africa. For the DRR lectures in such countries sometimes translators are arranged. However, it has been impractical with online teaching. UK_HUD_1 described her experience "..sometimes they can't get the same message that we deliver from English. If we do it for a face-to-face one, we will go to Indonesia and we will engage Translators as well and we can do it in a very effective way. So, in that sense, I would say with the language barrier there as a limitation"

- DRR courses/modules often require researching and referring to scientific (peer-reviewed) journals and other reliable resources. However, students in some countries do not have the accessibility to such decent resources. UK_HUD_1 explained this "students in Sri Lanka sometimes don't have access to those resources, they don't have Open Access to such particular journals. So, it's sometimes very much tricky to give them these reading lists."

- Data, signal, internet, power related issues: This is another common issue for students located in developing countries and sometimes it is not a matter of affordability. For example, in Sri Lanka, due to the ongoing economic crisis scheduled power cutes took place for long hours to poor internet quality and higher data costs. Regrettably, these countries are vulnerable and online DRR learning can be significantly impacted by these issues. UK_HUD_6 mentioned his experience as "Internet service around the world wasn't always reliable. We did have a student studying in Africa and their connections were just not good enough."

- Distractions in houses: Yet again these social challenges are common in the countries that most benefited from an educated DRR community. In other words, these social challenges are mostly associated with poverty hence are common in vulnerable developing countries. The interviewees from Sri Lanka confirmed the facts and according to UK_HUD_4 "sometimes in houses students don't have dedicated places for study. There are a lot of distractions and if you are a parent keeping the children away from your lectures would be really difficult". These factors reflect the affordability of online DRR education to such students. According to the UK_HUD_6, these distractions can exacerbate for working students; the "problem of having to manage the balance between what they have to do for work and that they have to do for education can cause problems when you're coming up to submission deadlines."

- Although it is not unique to DRR students, too much time spent in front of a computer screen can be harmful (JP_KEIO_4)

LIMITATIONS FOR THE EXPERTS

- Although not unique to DRR, many interviewees highlighted their struggle to understand their student cohort without being able to see them. It should be noted that none of the interviewees mentioned demanding their students to switch on cameras for the online lecture. By that means, in-person lectures allow them to understand students better. According to UK_HUD_11 "we understand the body language so we can identify which students are actually engaged". UK_UCLAN_I stated if a student is on campus, and nobody understands a lecture, there is more "camaraderie and reassurance in finding other people that are also confused". UK_HUD_2 mentioned "tutors and students don't get that same feeling as you would be in a classroom or when you have direct contact or one-to-one contact. So, when that's not there, lecturers may not see and may not get a feel for how the classroom is receiving what you're delivering. And you don't get that instant response. You can't observe it." According to UK_HUD_9 "in a kind of purely face-to-face environment, I would meet the students, I would have those kinds of off-the-cuff, informal conversations with them where you'd understand those desires, you'd understand those passions".

- Yet again as a common online education-related challenge, online educators should pose adequate skills and have access to quality resources, which sometimes could be challenging for some educators. UK_HUD_8 explained "If we are preparing for a proper online programme, we need to use good resources, high-quality videos, demonstrations, video editing and so some educators may need help from extra experts who could record and edit sessions"

- In advance preparation required for the online session could be ineffective sometimes, especially when there is a need to accommodate changes. UK_HUD_9 explained his experience "process of updating and changing content has a different timeline and process attached to it or associated with it. So, for example, in normal teaching in the face-to-face environment if I'm giving a lecture or a tutorial or a discussion even right up till the night before I can add in bits from the news. I can tweak things really easily". He further added "process of editing or changing them even slightly is kind of a little bit more time consuming or it requires thinking"

- UK_UCLAN_4 who teaches a DRR module using equipment focused on the inability to access important equipment during online learning. According to the expert, "it is difficult to explain to students what the equipment is, what is it used for and how to use in; you have to use so many

words to do this. But if you are able to put the equipment in front of a student, they know what it is immediately." Hence, explaining each item of equipment is very time-consuming and thus not efficient, making online learning less effective.

- Similar to the above situation, UK_UCLAN_3 discussed a critical limitation for a module that they teach, which typically contains many field trips. Clearly, such a module is difficult to move online and consisted of virtual field trips during the COVID-19 outbreak. In this online module, students watched a video that somebody had created while taking a tour of the site of the field trip but stated that this is very much not the same as students being themselves. Students who missed out on these experiences were unable to go to the actual places and talk to the local people or workers.
- Results from LUND, Sweden advice on the need for educators to "*put more thought around their course building*" and develop an enhanced cultural awareness adhering to the need to adapt their course content and teaching for a more culturally diverse student body.
- Although it is not unique to the DRR field, assessments in an online environment can be problematic. For instance, JP_KEIO_5 argued that prevention of cheating is difficult in the examinations of the students

d) What are your views on the flexibility of educators to determine the delivery method (fully online or partially online) following the emergency shift of education to an online setting during the Covid 19 outbreak?

The majority of the educators stated that there was not any option and they had to respond to that emergency and expected events/situation adhering to the decisions made by the University administration. However, despite having no choice about switching to online learning during this time, Interviewees thought that the teaching staff in general performed well. It was not a smooth transition for many, especially the experts from Sri Lanka with fewer resources compared to the UK. While the majority of experts were not entirely pleased that they were left with no option but to follow the orders, UK_HUD_6 interpreted it as "It's not their flexibility to follow orders, but their flexibility to understand that they're going to have to change their teaching method. They're going to have to work harder to engage students. They're going to have to work harder to make sure that students are understanding things, giving additional resources". SW_LU_8 who approached the question differently, more from a regulatory and decision-making stance, argued that flexibility depends on the context, as in the government decides and then institutions and educators adapt their course design. This approach leaves educators with limited flexibility as to what delivery method to apply. SW_LU_6 agreed that determining one's own delivery method is not that flexible. Yet, they believed that educators should be engaged in making the decision on the delivery method, moving forward. For instance, UK_HUD_11 mentioned "tutors need to have a say in it and need to determine what they feel comfortable with and what they see as actually works best. According to SW_LU_4 "now we are back 95% doing the same things as before Covid". In fact, as per the University regulations, some VGTU programmes are fully in-class sessions. The VGTU approach is as follows;

- All bachelor students returned to classroom learning;
- Generally, for Masters' students, the theoretical lectures are online and case studies and laboratory works are in classrooms (face-to-face);

- For Masters' students in hybrid learning the theoretical lectures are online and case studies and laboratory works are 50/50 (in the classroom and at the same time online).

Amongst the interviewees, there were also experts who conducted online sessions even before the emergency shift of education to an online setting during the Covid 19 outbreak (especially those who were interviewed by KEIO, Japan). All in all, educators felt that the majority of sessions should be delivered face-to-face, yet there may be occurrences where this is not possible; so, delivering an online session is more beneficial than missing a session. However, UK_UCLAN_8 shows concern over the fact that the flexibility of online sessions would be abused by educators who "don't want to come to work" as it can be easier to work at home rather than "coming up and facing the students and being challenged by the students". Perhaps because of the potential for abuse in this way, UK_UCLAN_7 shared that their school had a 100% in-person teaching policy, where no online teaching was permitted since the COVID-19 policies are no longer in place.

e) What development in DRR research, recent developments, policy, and practice need to be reflected through the DRR education curriculum? What aspects are underrepresented?

There are certain attributes in DRR through which the developments can be viewed. According to JP_KEIO_3 that involves the below;

- Organizing issues that can be understood from the experiences and words of the survivors and the affected local government officials themselves.
- Presentation of issues and practical activities by various levels, such as residents, local governments, national government, and support groups (such as start-ups and NPOs) which could be witnessed through online education.
- Cases-based methodology and upscaling such cases as examples into concepts are worth to be added into DRR curriculum: such case studies would enable students to personalize the examples in order to find their silver linings that could be incorporated into their understanding of DRR.

Mentioning the recent developments UK_HUD_11 mentioned the rapid attention drawn to building resilience following the COVID-19 impact. He further stated, "it is the perception of society that has been changing towards building resilience". Describing this missing link UK_HUD_3 added "if you take the DRR cycle I think in Sri Lanka we are very much concerned about the response, what are we going to do after the event right? How we are going to protect the displays community, who in the relief camps and how we are going to give three meals for them, something like that. Then how we are going to reconstruct their house". Adding similar thoughts SW_LU_7 argued that DRR education has been unevenly focusing on preparedness and response rather than prevention and the recovery phases and thus there needs to be some balance between these aspects to achieve a more rounded approach. On the other hand, SW_LU_2, in contradiction to the previous view, emphasized the need for a context-specific approach to response. In every country, there are different institutions that are engaged in response and thus a need arises for practitioners to be context-experts, beyond their own country-specific response structure. SW_LU_1 also

included DRM in the discussion and reflected upon the need to introduce more critical power perspectives in the discussion and at the same time move beyond the practitioners' approach and critically reflect upon mainstream practices in the field. SW_LU_2 also reflected on the importance of a critical stance and the need to introduce more courses related to ethics in DRR. Interviewee 4 discussed that capacity development is an aspect of DRR and DRM that need to be integrated more into education programmes. Finally, SW_LU_9 pointed out that the securitization of the field, especially in Sweden is not yet addressed by education curricula and thus should be given priority in the coming years.

A repeated aspect that needs to be reflected in the DRR curriculum is technological development. UK_HUD_2 explained "we talk about industry 4.0, industry 5.0, the new things that can be used in DRR because DRR responses still seem quite traditionally most of the places, most of the countries unless it's a developed country. So, I think that that needs to be that aspect needs to be integrated." According to UK_HUD_1 "social aspect of DRR, the economic aspect of DRR are very much covered. But when it comes to the technical ground of DRR, I think DRR education is not that much covered. It's the early warning systems like that what I mean by the technical knowledge. So, to get this technical knowledge, sometimes we need the industry experience because there is no such education programme to learn that." Moreover, having a complete understanding means they are being aware of the limitations of technology use as well. Not only technology, the educators need to be updated in general with all new cases, legislation, standards, best practices, etc. related to DRR. This is particularly important at the moment in the UK because there is a lot of new legislation coming out following the Grenfell disaster in London. UK_UCLAN_8 believes that up-to-date standards and best practice should be reflected through the DRR education curriculum. They shared that it is important for educators to make sure that the information they are sharing with students is up to date, and that they are using materials from 2022, although they should still reflect on the past.

Positioning disasters in the systematic equilibrium and reflecting on all the cascading effects and ripple effects they could have on different components in the urban ecosystems is another aspect that needs to be taught to the DRR learners. UK_HUD_4 stated, "systematic nature of risk has to be addressed and then these cascading effects". Looking at the holistic picture involves discussing soft issues such as gender differences, marginalised communities, etc. These soft interventions can be identified in an extensive range. For instance, according to UK_HUD_10 "we completely neglect the fact that there is traditional knowledge out there that different people understand disasters completely differently. So, there is no there is literally nothing universal in Disaster Risk Reduction... It's very rare that you see a strong reflection and strong engagement with indigenous epistemologies, for example, a kind of reflection on traditional knowledge".

DRR is a team effort and the team consist of stakeholders from different disciplines. Therefore, it is vital for DRR learners to understand the interdisciplinarity in DRR. According to UK_HUD_5 "we could do better in explaining to students the importance of interdisciplinarity. Particularly bringing together sort of more math-based hazard risk assessment modelling with the social science interest in vulnerability and the arts and humanities interest in thinking through more fundamental issues of representation. I know we do all of those in many courses, and I know that we give options for students to have an interdisciplinary experience, but I think what we perhaps don't do so well is unpack those disciplinary perspectives so that they are easy to approach for students from the outside. And so, they can follow them through; so that's at a very abstract level. What I think is underrepresented, is not the actual content of these different disciplinary, ways of approaching DRR. But the unpacking of them, A sort of presentation of them and guidance through and they tend to be thought of as lines of specialism within an interdisciplinary context,

rather than lines through which one can become". Adding similar thoughts UK_HUD_6 mentioned "I think that whole holistic approach is sort of missing from the research and I don't think it reflects down into the curriculum... when you're talking to practitioners on the ground, they understand this big picture. But they got their own particular problem. And the real issue is how their solution interacts with other people's solutions.. that's the thing that needs to be explored in a sort of safe space. So, I think that's an area that we as educators have an obligation to try to raise the issues about."

Disaster ethics: UK_HUD_7 who understood disaster ethics as an underrepresented aspect in the DRR curriculum stated "We talked about disaster ethics in disaster research. We talk about disaster, bioethics you know, how are you ethically responded to things like COVID. But we don't talk about actual ethics in preparedness, policy ethics and response ethics as it relates to vulnerability and racial injustice. I understand that people will criticize that ethics can be subjective. I disagree. But like that, there's this. Look, here's the logic of why we do things ethically. I'm not saying that that makes any of your decisions easier, but there are ways to think about your decision so that at least you know that you've made an ethical decision. There's not enough ethical theory and ethical decision-making and how preparedness is the most ethical thing we can do for DRR, and I don't think that there is anywhere near enough ethics in a crisis going on in our curriculum. "

Understanding data includes not only analysing and forecasting but also discerning their limitations of them. Therefore, it is essential that DRR learners have a completely correct understanding of the data they handle. For instance, UK_HUD_9 mentioned, "people do need to understand what data means, what data tells them; if they see a forecast about an earthquake, that doesn't necessarily mean there will be an earthquake, but if there's an early warning, that means there will be an earthquake."

Progress towards different development agendas related to DRR: While the DRR curriculum usually covers several development agendas including the SENDAI framework, the state-of-the-art developments are not sufficiently communicated to the DRR learners through a taught series. As per UK_HUD_9 "it's important to be able to communicate and teach whatever progress we might be making those particular SENDAI targets." JP_KEIO_7 has stated that the post-2015 framework, SDGs, Climate Change, social innovation, new technologies, and the new targets for Disaster Risk Reduction need to be brought into teaching

DRR efforts in the global north: UK_HUD_9 as an educator teaching a DRR student coherent of which the majority is from the global north stated "I think there is an underrepresentation of Disaster Risk Reduction and global north contexts. And that might sound like quite a provocative thing to say. But if I reflect on my average students and many of them are attracted to learning about Disaster Risk Reduction because they've experienced floods themselves. Where I worked, many of our students had experienced flooding and the kind of losses associated with that. And so, when they came to learn about Disaster Risk Reduction. That had an expectation that they would learn I guess ideas that would relate to their lived experience of disaster. And I think certainly the way that I had set up the modules initially Disaster Risk Reduction through its histories, through its various kind of global sort of manifestations, and through the case studies, I was using, which were largely from global South context. That didn't always necessarily speak to their own experiences of disasters, and how they might kind of contribute to, to risk reduction sort of practices in the future."

UK_HUD_10 argued the importance of referring to the work/research that is not written in English. As a universal language, the DRR learners commonly refer to sources written in English it is rarely that students refer to research written in other languages. UK_HUD_10 explained this ". literature that is not in English,

like all the stuff that is written in Latin America. We are not engaging with that. And so, we keep replicating. We are asking our students to replicate the knowledge that is already there, reinforcing what we know, our own silos, our own ontologies. We don't allow our students to see how those scholars have evolved"

Business continuity planning and disaster recovery planning aspect should be given more attention in DRR. JP_KEIO_4 considers that infrastructural damage and business continuity plans to secure the source of income for the people need to be considered vital. Businesses need to withstand a disaster in order to support a nation's economic pillar. Any organization/business entity can follow to maintain enough strength and resources to react and come out of the crisis successfully. Therefore,

- Business continuity planning and disaster recovery planning
- Human loss, damage to infrastructures, and huge destruction as economic issues
- Industries and factories affected by disasters in particular areas and the source of people's livelihood need to be reflected through the DRR curriculum.

JP_KEIO_5 identified the below areas as underrepresented;

- **The role of media** is not much taught at the course level
- **Green infrastructure development,** eco DRR, linking disaster-related research with climate change and developing the course curriculum on that
- **Climate-related models** on how the climate hazard has been contributing to the different disaster impacts. Adding to that SW_LU_5, SW_LU_6 and SW_LU_9 agreed that climate change adaptation is an aspect of DRR and should be given prominent attention because "the mitigation agenda is failing" as stated by SW_LU_5. SW_LU_9's reflection on their own organisation and the programme saw climate change adaptation as significant underrepresentation, recognizing at the same time the time constraints that come into play. UK_UCLAN_1 added a similar thought and felt that there was not enough focus on climate change and the impact that climate change is going to have, which is underrepresented during DRR education.

JP_KEIO_ 10 believed that health as an important element, both as cause and consequence, in the disaster is underrepresented, particularly outside the health sector and for non-biological hazards/disasters. Adding to that UK_UCLAN_1 also believed that there was not enough focus on the psychological aspect of emergencies. According to them, although human psychology plays a huge part in the effectiveness, efficiency or success of disaster management, and can dictate whether there are many or few survivors, it is something that "tends to get missed a lot".

JP_KEIO_ 9 highlighted the need for topics like giving equal opportunities to the existing great number of mature-aged students, 50-60 or even above 80 years old in the field of DRR education, as important

It could be observed that interviewees came up with different aspects. At the same time, they were largely focusing on DRR research or policies that are relevant to their interests or area of expertise. UK_UCLAN_3 focused on their area of expertise, stating the impact of waste crime should be represented through DRR research, as well as the environmental impact of this. They felt that a greater awareness of policy legislation and responsibility that individuals have as well as accountability is under-represented. Furthermore,

ownership of the situation is important as "people are always happy to blame everybody else". Increasing DRR education about the impact of waste crime can help people to take responsibility for the problem, as UK_UCLAN_3 finds that "ownership is the biggest challenge in my sphere of research".

UK_UCLAN_6 felt that an important area that should be reflected through DRR education is the impact of wildfires and wildfire development as well as management strategies and evacuation strategies. There should be particular emphasis on evacuation strategies, as this is also relevant to many other types of disasters as people often need to be evacuated during such events. Important areas of evacuation to focus on are the logistics of where people are going to go, and the needs of these people, including how long they are going to be displaced.

Furthermore, the VGTU results suggested having educational need assessment, dynamic and ongoing educational planning, finding the best educational approaches, the best educational content and the best educational tools with notice to educational involved organizations. They further recommended having community-based educational approaches along with more effective and efficient mass customised teaching and learning policies.,

f) What are the emerging skills and knowledge DRR learners should possess to meet employer expectations and market needs?

Many experts viewed this as an interesting aspect to think about and frequently referred to their experience and discussions with graduates and professionals from their networks. SW_LU_9 went on to discuss a fundamental issue with students who are finishing their studies and are on the verge of becoming practitioners in the DRR and related fields. As stated, "students underestimate how much skill they actually have, and they overestimate what they are expected to know". Below is a list of skills identified by the experts to be useful to practice in the field of DRR;

- Action-oriented knowledge, i.e. practical knowledge that is applicable in the field at any stage of disaster (JP_KEIO_ 6).
- Digital technology requirement, developments (UK_HUD_1, UK_HUD_2, JP_KEIO_5)
- Ability to work with others (UK_HUD_11)

SW_LU_7 stressed the need for practitioners to be capable of not just working with different stakeholders but also creating the preconditions for these stakeholders to work together. Practitioners need to have developed their social skills but also as SW_LU_3 stated, "see the goal before yourself".

- interconnected thinking or IT system thinking, willingness to reach out into other ways of working (UK_HUD_5)/ interdisciplinarity (UK_HUD_7)

SW_LU_8 connected this skill to "being able to understand the interconnectedness of different aspects of DRM and DRR" but also discussed the importance of employing a systems perspective for problem-solving.

SW_LU_1 mentioned, "having a helicopter perspective" to be able to see the full picture and the variety of perspectives that exist.

- Communicating disaster risk in a non-technical way across disciplines and to communities (UK_HUD_6)

JP_KEIO_ 8 explained this as data analysis, data explanation, and early warning to be linked with the community so that the community gets the benefit

UK_UCLAN_ 1 referred to this as "command and control". It is an important aspect of this is how to deliver training that is effective to help people if they are in an emergency situation and how to understand the psychological aspects of such a situation.

- Ability to adapt to different working environments and learn fast, as well as being critical (SW_LU_9)
- Project management skills (UK_HUD_9)

SW_LU_4 referred to this as "Knowledge and understanding of processes of developing somebody else's capacities",

- Critical analysing (understanding of how problems, issues and inequalities emerge; understanding of how policy drives on-the-ground action; differentiate contexts) (UK_HUD_9). UK_UCLAN_ 1 highlighted the interesting mix of practical knowledge involved, such as knowing all of the legal protocols and the procedural elements during energy events.

UK_UCLAN_6 stated it is important to have the ability to look at problems that various communities are facing and to think about different solutions that may solve the problem

- Database management and analytics for collecting and processing vast amounts of data to come up with the different types of DRR scenarios (JP_KEIO_ 4 & 9).
- Networking with people and interacting with different disaster management-related agencies to understand the type of research funding agencies are looking for to enhance the potential for employment of the students by getting firsthand experience, during the coursework, during their study (JP_KEIO_ 5).
- Sound financial knowledge (JP_KEIO_ 9)
- Creativity- UK_UCLAN_5 felt that creativity is a skill that DRR learners should possess. This is an important skill as individuals never know what they are going to face each day, so they must have the ability to creatively solve problems that occur. By having creativity skills, individuals can think about solutions that have been found for problems in the past and adapt these to suit problems that are occurring today, quoting Einstein: "You don't solve the problem of tomorrow with the solutions of the past"

Although some interviewees did not go into depth about the skills and knowledge that DRR learners should possess to meet the employer's expectations and market needs, they did list some of the potential skills and knowledge. The ability to critically analyse data in an effective manner; the ability to work across multidisciplinary areas; to be highly functional under stress; and to work as part of a team were repeated by interviewees from all 4 contexts.

3.4. Impact of student-specific challenges/difficulties for online and distance DRR education

g) Many students face barriers in accessing education and that may hinder a student's full and effective participation on the same footing as others. In your experience, what students are excluded from accessing DRR education?

What types of barriers have you observed among your students?

The educators' concerns centred around the issue of the digital divide and socially disadvantaged groups of people. They are mentioned as follows:

- Those who do not have sufficient access to high-end use of the internet, or devices and are not equipped with digital literacy (students from underdeveloped/ developing contexts)

In answering this question, many experts identified certain groups of students living in developing countries. The underdevelopment in terms of online education results in hindrances to the education of students in developing countries. UK_HUD_10 stated this "we only go as far as infrastructure goes. And so those living in the remote locations, which are very often affected by disasters, these are the students that we do not give a chance for participation". UK_UCLAN_ 8 too highlighted digital poverty as a key challenge and shared that many of their students, even in the UK did not have a computer at home at the start of the COVID-19 outbreak JP_KEIO_4&5 added similar thoughts as well. As SW_LU_ 7 remarked, people who are based outside capitals are more likely to have unstable or even no proper connection and thus keeping up with online lectures and other related material might be a challenging issue. SW_LU_ 6 mentioned the example of students and practitioners based in small islands. Another group of students that are affected by the shift to an online environment is that which has had limited exposure to a digital setting and are not familiar with using online tools, as mentioned by SW_LU_ 7. A variety and combination of different online tools might be a benefit for some as far as the improvement of the learning experience is concerned. However, for others, it might become a barrier and a stress factor when it is required to learn how to use a lot of tools within a short period of time.

According to Alvarez Jr (2021), together with governments' investments in digital infrastructure, public and private sectors' collaboration is also vital to rebuilding a connected society. United Nations (2020) highlights the need for reducing connectivity costs and bridging the digital divide through investing in digital literacy for marginalized populations. Students' purchasing power should not be the determinant of their eligibility and desire to get an education. Therefore, it is important to develop more affordable devices, offline digital learning resources, etc. that are of high price and unaffordable to learners from remote areas and low-income backgrounds (Huang et al., 2020).

- Those who are not able to take part due to professional responsibilities, family-related matters, illness, location of the residence, and so on (students who struggle with competing priorities)

Distant and online education has also become the ultimate option for those who have personal, socioeconomic, and health issues that prevent them from attending on-site classes (Bell & Federman, 2013).

Especially, in postgraduate DRR programmes/courses there is a significant proportion of working students (DRR professionals). Time becomes an evident constraint for those who have 8-5 jobs, even to attend online

sessions. UK_HUD_1 explained this as "practitioners in DRR are very busy, sometimes they are doing jobs from eight to five jobs". Similar comments were made by SW_LU_6&5.

Due to different physical disabilities, DRR learners are not capable to visit the site although most part of DRR learning is visiting fields and onsite learning. UK_HUD_3 mentioned, "students who are unable to visit the fields and get the physical experience" as a group that usually becomes excluded from receiving full and rich education on the same footing as others. Furthermore, UK_UCLAN_7 states that there can be a very lengthy process for students with a disability to get support and have adjustments made. If students are on a one-year-long course and it takes six months to get additional support, there is a major problem. Besides the personal issues, SW_LU_5 indicated that certain methods such as the blended one, where one needs to travel might come with greater complications in the post-Covid era since visa applications have become a more difficult process.

The UK higher education is keen on ensuring that non-visible disabilities are not invisible. UK_HUD_7 highlighted different learning difficulties that may result in a struggle for DRR learners to read legibly. As per her "especially students that are neurodiverse, for students that are dyslexic, students that are ADHD, reading is quite hard". While reading is an essential element in typical DRR education, there could be students excluded in the case the education provider does not look for inclusive and atypical pedagogical approaches". SW_LU_2 added to the above category of students who have issues with focusing in a non-classroom setting.

SW_LU_11 touched upon a serious issue which is the mental health issues in the post-Covid era and the effects of long-term social isolation as a crucial factor both for the health of the students but also for their ability for effective learning through online means that might exacerbate this feeling of isolation.

JP_KEIO_9 added similar thoughts as well.

UK_UCLAN_1 also felt that students who have childcare responsibilities may be excluded from accessing DRR education. If a course is running from 9:00 o'clock in the morning and through till 6:00 o'clock at night, then childcare for the evening sessions can be difficult.

- Students from impoverished and disadvantaged communities; linguistic minorities; lower class; people in remote areas (Interviewee 10)

There can be a clear language gap for students coming from counties in Africa, and South East Asia when they enroll on DRR courses/programmes taught in English. UK_HUD_10 described this as "..marginalised are excluded. We learn from the privileged and we pass that knowledge to the privileged. By the most marginalized I mean those who do not speak English or who do not have a certain handle of English".

Women with children especially young/first-time mothers are likely to struggle in receiving education compared to a normal student. Sometimes students (regardless of the discipline) fail to manage competing priorities and education does not get to the top of their lists. This could be due to various reasons and poverty is one of the most significant. For instance, UK_HUD_2 stated, "I have some experience working in countries like Bangladesh where actually the if you go and visit the places they didn't even have the basic necessities, so in the contexts like that, education is second to food and housing, the other requirements of people may just go and find some job rather than trying to seek for education". In fact, living costs for current university students are significantly high.

Often if the parents (previous generations) do not realise the value of education, the students may receive less support and encouragement. Especially with different cultural expectations and values, certain jobs be attractive than DRR relation professions. UK_HUD_2 explained this "if the previous generation doesn't have that educational background. But if they're not keen they may not push this student to get educated that that would be an issue". According to UK_HUD_5 "biggest forms of exclusion are money and previous education". Previous education often is a factor that decides the eligibility for university entrance or to learn DRR. JP_KEIO_10 added similar thoughts as well.

Adding similar thoughts, UK_UCLAN_2 stated that students in 3rd world countries may be very intelligent, but their financial situation may not allow them to attend formal education. UK_UCLAN_4 remarked that underprivileged students may need to work to earn the money to attend university. However, as the university can be a three- or four-year investment, it is difficult to know whether this is going to be worth the effort, the time investment, and the monetary investment. UK_UCLAN_5 acknowledged that some people do not have enough resources to follow the course that they want to follow for the duration that they want to follow it. Although UK_UCLAN_2, 4 and 5 focused on the monetary aspects of underprivileged students, UK_UCLAN_7 stated that students who may be the first person in their family to come to university have what we call language poverty. Search students can struggle to form a connection with other students at the university and can struggle to understand the "kind of posh way that we want to assess them". such students may struggle more at university due to this social class division.

UK_UCLAN_1 who described a scenario in the UK context considered that students who are ethnic minorities may also be excluded from accessing DRR education. Typically, an emergency manager is a certain type of person. Women and people from different ethnic minorities bring an entirely different perspective to Emergency Management due to their different life experiences and the fact that they may not make some of the assumptions that other people might. However, there are very few women and individuals from ethnic minorities who feel they have the skill set to be emergency managers due to the stereotype of a typical emergency manager being a white male.

WHAT TYPES OF BARRIERS ARE AMONG YOUR STUDENTS?

- Technical issues in developing countries include poor quality and unreliable internet, power cuts, other common network issues, technology gap and overall disparity of technology availability.
- Family commitments and distractions, especially the students with parenting responsibilities (UK_HUD_10 explained her experience of one of her students as "She's a mature student. She has got two kids. She had to pay for a hotel room to sit an online exam"), lack a support network.
- Living costs as a student and other financial constraints
- Competing priorities for students from disadvantaged and impoverished communities
- Students with physical disabilities (especially mobility issues that affect their experience in the field
- Language barriers and difficulty to understand accents
- Lack of confidence. This includes the ability to work always under stressed conditions (JP_KEIO_6)
- Insufficient basic/functional knowledge to pursue DRR education/ higher level of requirements to become eligible to enrol to DRR related courses/programmes (UK_HUD_5 referring to his

experience in sub-Saharan Africa mentioned "students might have masters degrees, but they're functioning at the level of a first-year undergrad. Their functional knowledge is way below")

- International students not blending well with local students. UK_UCLAN_7 indicated that integration between different types of students may be more dependent on the specific cohort and the individuals involved in the course rather than large collections of people with opposing views.
- Physical and mental health-related issues. For instance, UK_UCLAN_6 remarked that students with learning difficulties such as dyslexia may struggle more in the courses the students who do not have dyslexia and it is important to put mechanisms in place to help and support such students.

What online / distance learning strategies and LMS features/functionalities are effective in reducing those barriers?

According to UK_HUD_7 inclusive education is all about removing all the barriers to students. Therefore, barriers will not exist if inclusive education is provided as irrespective of the barriers DRR learners encounter they still can receive education on the same footing as others. UK_HUD_7 summarised her idea as "if we've effectively developed our modules, it's not the students, it's us. let's not exclude them. Let's just make a module that they're allowed to access, they need to know it just as much as everybody else." Therefore, it can be fundamentally argued online and distance learning strategies and LMS features/functionalities need to be chosen in a manner that protects inclusivity in education. In other words, DRR modules/ courses/ programmes need to be designed to foster an inclusive learning environment. This needs consideration beyond selecting the online / distance learning strategies and LMS features/functions that nurture inclusivity in online DRR education. Below are some good practices acknowledged by educators;

- Including an asynchronous element (to increase the flexibility of learning and to allow revisiting the content helps with all the above identified 3 types of barriers)
- To help the working students to manage their time, UK_UCLAN_1 stated that scheduling courses in a one-week block are beneficial for students who work full-time, as they may be able to use their own paid holiday to complete the course or module. UK_UCLAN_1 has also scheduled courses to include a mix of online and in-person lessons, with three days on campus on two days online.
- Including tools and strategies (ex: Kahoot quizzes, online forums) to enhance engagement (to replicate classroom dynamics) during asynchronous sessions
- Intelligent use of user-friendly and non-complicated online tools in teaching (SW_LU_7 discussed that a simple way to reduce the familiarity with the digital setting barrier is to limit the number of tools used and as SW_LU_6 added, to only use practical user-friendly ones. SW_LU_5 and 7 suggested flexible coaching sessions for specific tools prior to their use. This could be successful in an asynchronous setting by pre-uploading videos with instructions on how to use a tool before the synchronous setting. These tools should be inclusive. For instance, the chat tool is a student favourite that does not add pressure in responding in class)
- Designing assessments strategically without time limitations (carefully deciding controlled conditions)

- Keeping the cost of online DRR education to a minimum
- Encourage text-based answers/ responses (This helps the students who are more comfortable and perform better with anonymity as well as for students with speech impediment/impairment)
- Setting up self-assessments to evaluate the current levels of their knowledge/position (According to UK_HUD_5, this could allow them to take pre-degree courses if required and better manage the complexities in the subject area)
- Having alternative communication/teaching means and multiple ways of accessing the same information (for instance; having podcasts for students with reading difficulties. UK_HUD_7 explained this referring to students that are neurodiverse, students with dyslexia, students with ADHD, etc. for whom reading is fairly difficult "We don't need them to read everything. We don't read everything we go to conferences, we listen to podcasts, we listen to, you know, Web recordings. So, I think that offering students varied ways of accessing material in addition to reading they must read because we need them to write. And so, they're not going to write better if they don't read better. But giving them multiple ways of accessing the same information so that they can."). SW_LU_1 also suggested that a flexible combination of structuring courses around different teaching methods has the potential to reduce barriers.
- Institutes to have mechanisms to provide support. This includes students having access to facilities that provide internet connection, as well as computers, which would be very effective, for example, internet cafés.
- Audio and video-featured lectures and success stories are found to be effective by making a step ahead of the lesson by cheering up the students to get inspired to be involved in DDR education and sector (JP_KEIO_6).
- Frequent discussions with students. This is important to discuss the issues they have and specially to inform the students of the commitment needed early, as it is important to set the students' expectations upfront so that you are less likely to have students on your course who can't make the time commitment
- Facilitate the use of different software and transcriptions of lectures to help students with language issues and learning difficulties. UK_UCLAN_ 6 remarked that they have used software called Ally that allows students to change the language during an online lecture, which is very helpful for international students as well as software that can read aloud written information and change the font to make the material more inclusive and accessible.

However, it should be noted that this question was more challenging for most of the interviewees as they tried to relate to the short period of time since the switch to an online setting because of Covid and the limited feedback that many of the interviewees mentioned.

4. Conclusion

This report presented a lengthy discussion on the status quo of the teaching and learning strategies and the existing challenges in the online DRR education in the perspectives of both the learners and the educators.

in terms of the experience of the learners in the context of pedagogical approaches in DRR education is more towards passive and educator cantered process. There seems to be a high tendency in the use of LMS and virtual learning environments (VLE) as a prominent learning strategy. Further, there is a more preference towards interactive synchronous learning strategies over asynchronous strategies. On the other hand, the lower utilisation of strategies such as class blogs and game-based learning, the status quo shows that the self-learning approach or the student cantered approach is yet to be developed within the DRR education sector. Further, with the none use of these strategies in online education, it reveals that the education sector is yet to discover modalities to include active learning to the sphere of online DRR education. On the other hand, the interviewees were conversant with online teaching in general. In terms of the use of the above 5 key approaches MOOCs have become the least popular pedagogical approach among the interviewees, whilst 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.

In terms of the common challenges in the field of online DRR education, inadequate ICT infrastructure, unavailability of certain courses/modules offered online, digital literacy deficiencies, discontinuity of education due to personal reasons that affected effective participation in education on the same footing as others, emotional disturbances and health issues due to prolonged screen/digital device use and data cost and cost of accessibility (to learning content) were highlighted as key challenges.

In the overall conclusion it is visible that the learners prefer synchronous learning strategies to be more effective while the educators are more concerned towards making their online DRR classrooms more active with more authentic interactions. However, when inquiring the status quo of the prevailing challenges in the online DRR education field, to divert the existing DRR education sector towards a more effective online education, the following should be considered:

- Making sure the relevant infrastructural facilities and relevant skills of the educators and the learners are in place.
- Considering the nature of various leaners in terms of their learning cognitions and personal commitments, and
- Considering the social and vulnerable contexts of the learners as well as the educators.

References

Albrahim, F. A. (2020). Online teaching skills and competencies. *Turkish Online Journal of Educational Technology-TOJET, 19*(1), 9-20.

Albrahim, F. A. (2020). Online teaching skills and competencies. *Turkish Online Journal of Educational Technology-TOJET, 19*(1), 9-20.

Al-Mamary, Y. H. S. (2022). Why do students adopt and use learning management systems?: Insights from Saudi Arabia. International Journal of Information Management Data Insights, 2(2), 100088.

Alman, S. W., Frey, B. A., & Tomer, C. (2012). Social and cognitive presence as factors in learning and student retention: An investigation of the cohort model in an iSchool setting. *Journal of Education for library and Information Science*, 290-302.

Alvarez Jr, A. V. (2021). Rethinking the digital divide in the time of crisis. *Globus Journal of Progressive Education, 11*(1), 26-28.

Arsyam, M., Alwi, A. M. S., & Fadhil, M. (2020). Learning at Home in the Family Environment during the Covid-19 Pandemic. Retrieved from https://osf.io/preprints/syv48/

Bachri, S., Irawan, L. Y., & Aliman, M. (2021). E-module in Blended Learning: Its Impact on Students' Disaster Preparedness and Innovation in Developing Learning Media. *International Journal of Instruction, 14*(4), 187-208.

Baran, E., Correia, A.-P., & Thompson, A. (2013). Tracing successful online teaching in higher education: Voices of exemplary online teachers. *Teachers College Record, 115*(3), 1-41.

Bell, B. S., & Federman, J. E. (2013). E-learning in postsecondary education. *The future of children*, 165-185.

Biggs, J. and Tang, C. (2011) *Teaching for Quality Learning at University*. UK: Society for Research into Higher Education.

Boelens, R., Van Laer, S., De Wever, B., & Elen, J. (2015). *Blended learning in adult education: towards a definition of blended learning*. Retrieved from https://biblio.ugent.be/publication/6905076/file/6905079

Bonwell, C and Eison, J. (1991) *Active Learning: Creating excitement in the classroom.* Washington: George Washington University.

Bruscato, A. M., & Baptista, J. (2021). Synchronous and asynchronous distance learning of anaphora in foreign languages. *Texto Livre: Linguagem e Tecnologia, 14(1), e29177.*

Carter Jr, R. A., Rice, M., Yang, S., & Jackson, H. A. (2020). Self-regulated learning in online learning environments: strategies for remote learning. *Information and Learning Sciences, 121*(5/6), 321-329. doi:10.1108/ILS-04-2020-0114

Davison, R. M. (2020). The Transformative Potential of Disruptions: A Viewpoint. *International Journal of Information Management, 55*, 102149.

Dwivedi, Y. K., Hughes, D. L., Coombs, C., Constantiou, I., Duan, Y., Edwards, J. S., . . . Upadhyay, N. (2020). Impact of COVID-19 pandemic on information management research and practice: Transforming education, work and life. *International Journal of Information Management, 55*, 102211. doi:https://doi.org/10.1016/j.ijinfomgt.2020.102211

Fuller, P., & Yu, G. (2014). Lessons learned: online teaching adventures and misadventures. *Journal of Social Sciences, 10*(1), 33-38.

Gaspar, M., Cunningham, E. P., Valella, P., & Roberts, L. (2020). *Educator Survey Results: Remote and Distance Learning in the Time of COVID-19.* Retrieved from: https://www.cerego.com/lp-2020-remote-learning-report

Hall, T., Connolly, C., Ó Grádaigh, S., Burden, K., Kearney, M., Schuck, S., . . . Kosmas, P. (2020). Education in precarious times: a comparative study across six countries to identify design priorities for mobile learning in a pandemic. *Information and Learning Sciences, 121*(5/6), 433-442. doi:10.1108/ILS-04-2020-0089

He, S., Lai, D., Mott, S., Little, A., Grock, A., Haas, M. R., & Chan, T. M. (2020). Remote e-work and distance learning for academic medicine: best practices and opportunities for the future. *Journal of graduate medical education, 12*(3), 256-263.

Huang, R., Tlili, A., Chang, T.-W., Zhang, X., Nascimbeni, F., & Burgos, D. (2020). Disrupted classes, undisrupted learning during COVID-19 outbreak in China: application of open educational practices and resources. *Smart Learning Environments, 7*(1), 1-15.

Irawan, A. W., Dwisona, D., & Lestari, M. (2020). Psychological impacts of students on online learning during the pandemic COVID-19. *KONSELI: Jurnal Bimbingan dan Konseling (E-Journal), 7*(1), 53-60.

Jena, P. K. (2020). Online learning during lockdown period for covid-19 in India. *International Journal of Multidisciplinary Educational Research (IJMER), 9*.

Lemov, D. (2020). *Teaching in the Online Classroom*. Jossey-Bass.

Lestiyanawati, R. (2020). The Strategies and Problems Faced by Indonesian Teachers in Conducting e-learning during COVID-19 Outbreak. *CLLiENT (Culture, Literature, Linguistics, and English Teaching), 2*(1), 71-82.

Lipnevich, A. A., & Smith, J. K. (2022). Student–Feedback Interaction Model: Revised. Studies in Educational Evaluation, 75, 101208.

Littlefield, J. (2018). *The difference between synchronous and asynchronous distance learning*. Retrieved May, 4, 2020.

Makoe, M. (2012). Bridging the distance: The pedagogy of mobile learning in supporting distance learners. *Distance education*, 63-80.

Mäkelä, T., Mehtälä, S., Clements, K., & Seppä, J. (2020). *Schools went online over one weekend–Opportunities and challenges for online education related to the COVID-19 crisis.* Paper presented at the EdMedia+ Innovate Learning.

Nichols, M. (2003). A theory for eLearning. *Journal of Educational Technology & Society, 6*(2), 1-10.

Noh, J., Oh, E. G., Kim, S. S., Jang, Y. S., Chung, H. S., & Lee, O. (2020). Development and evaluation of a multimodality simulation disaster education and training program for hospital nurses. *International journal of nursing practice, 26*(3), e12810.

Palloff, R. M., & Pratt, K. (2013). *Lessons from the virtual classroom: The realities of online teaching*: John Wiley & Sons.

Purnama, S., Ulfah, M., Machali, I., Wibowo, A., & Narmaditya, B. S. (2021). Does digital literacy influence students' online risk? Evidence from Covid-19. *Heliyon, 7*(6), e07406. doi:https://doi.org/10.1016/j.heliyon.2021.e07406

Rehman, R., & Fatima, S. S. (2021). An innovation in Flipped Class Room: A teaching model to facilitate synchronous and asynchronous learning during a pandemic. *Pakistan Journal of Medical Sciences, 37*(1), 131.

Sánchez-Cruzado, C., Santiago Campión, R., & Sánchez-Compaña, M. (2021). Teacher Digital Literacy: The Indisputable Challenge after COVID-19. *Sustainability, 13*(4), 1858.

Schlesinger, S. L., Heuwieser, W., & Schüller, L.-K. (2021). Comparison of Self-Directed and Instructor-Led Practice Sessions for Teaching Clinical Skills in Food Animal Reproductive Medicine. *Journal of Veterinary Medical Education, 48*(3), 310-318.

Siemens, G., & Matheos, K. (2010). Systemic Changes in Higher Education. *In Education, 16*. doi:10.37119/ojs2010.v16i1.42

Simamora, R. M. (2020). The Challenges of Online Learning during the COVID-19 Pandemic: An Essay Analysis of Performing Arts Education Students. *Studies in Learning and Teaching, 1*(2), 86-103. doi:10.46627/silet.v1i2.38

Simamora, R. M. (2020). The Challenges of Online Learning during the COVID-19 Pandemic: An Essay Analysis of Performing Arts Education Students. *Studies in Learning and Teaching, 1*(2), 86-103. doi:10.46627/silet.v1i2.38

Tartavulea, C. V., Albu, C. N., Albu, N., Dieaconescu, R. I., & Petre, S. (2020). Online Teaching Practices and the Effectiveness of the Educational Process in the Wake of the COVID-19 Pandemic. *Amfiteatru Economic, 22*(55), 920-936.

Tartavulea, C. V., Albu, C. N., Albu, N., Dieaconescu, R. I., & Petre, S. (2020). Online Teaching Practices and the Effectiveness of the Educational Process in the Wake of the COVID-19 Pandemic. *Amfiteatru Economic, 22*(55), 920-936.

Torani, S., Majd, P. M., Maroufi, S. S., Dowlati, M., & Sheikhi, R. A. (2019). The importance of education on disasters and emergencies: A review article. *Journal of education and health promotion, 8*, 85-85. doi:10.4103/jehp.jehp_262_18

United Nations. (2020). Policy brief: Education during COVID-19 and beyond. In: United Nations.

University of Bristol (2021). *Digital Accessibility and Inclusion*. Retrieved from: https://www.bristol.ac.uk/digital-education/inclusion/

Wargadinata, W., Maimunah, I., Eva, D., & Rofiq, Z. (2020). Student's responses on learning in the early COVID-19 pandemic. *Tadris: Journal of Education and Teacher Training, 5*(1), 141-153.

Watts, G. (2020). COVID-19 and the digital divide in the UK. *The Lancet Digital Health, 2*(8), e395-e396