# Enhancing school safety through university engagement in DRR education

Chen, Y. F. & Adefila, A.

**Manuscript**

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**Abstract**

Effective Disaster Risk Reduction Education (DRRE) could reduce the impact of disasters, including the loss of lives, property and damage to the environment because DRRE enables communities to mitigate and prepare for potential risks (UNICEF 2011; UNISDR 2017). It is believed that universities could play a role in DRRE (Ahmad 2007; Holloway 2014); not only emphasising the need for the inclusion of DRR in curricula for all levels of education; but also proactively teaching and sharing DRRE in communities (Aghaei, Seyedin & Sanaeinasab 2018). This holistic approach widens the university's engagement in society and broadens impact of good practice.

A University in the United Kingdom has initiated a project to facilitate the university's engagement in DRRE in communities. The project combined specially planned field trips and placements in an optional academic module to encourage year 2 students to deliver DRRE in primary, junior and high schools in a foreign context (Chen and Blackett 2017). The project has provided opportunities for the students to develop inter-cultural competences and employability skills (Chen 2017). It also facilitated work-based learning and enhanced global learning through practice-based activities (Oyinlola et al. 2018).

The article introduces a Higher Education (HE) engagement model for DRRE, evaluates the effectiveness of the pedagogy and its impact on students' learning. The research demonstrated positive impact of HE students engaging DRRE in the community through fieldtrips and placement. It is recommended that the HE sector develops similar models to enable universities engage in collaborative networks that allows a more effective approach for DRRE.

**Key words:** Disaster risk reduction, environment education, internationalisation, employability, community resilience, community engagement, fieldtrip, internship

**Introduction**

Natural hazards have become a major global challenge as their impact on human life steadily increases. Whilst scientific and technical strategies have advanced, the loss of human life and property has nevertheless escalated (Thomas and López 2015). Effective risk communication to the public is necessary to ensure sufficient preparation, mitigation of potential risks and the development of capabilities to take appropriate response actions when disaster strikes (Terpsta et al. 2017). Providing relevant disaster risk reduction (DRR) education for citizens living in high-risk areas with a view to building a safe and resilient culture is imperative (UNISDR 2005). The Hyogo Framework for Action (HFA) (2005-2015) explained and characterised the extent of work required from different actors and all sectors to mitigate disaster losses attributed to natural hazards. The ten-year plan is framed around building resilience to disasters in nations and communities and has five priorities:

1. "Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
2. Identify, assess and monitor disaster risks and enhance early warning.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
4. Reduce the underlying risk factors.
5. Strengthen disaster preparedness for effective response at all levels"

(UNISDR 2005: 1)

Among these priorities, the subsequent Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR 2015a) emphasises that Disaster Risk Reduction Education (DRRE) should be promoted through formal and non-formal approaches to participants at all levels of communities. Promoting DRRE at primary school level is recognised as more effective because learners develop knowledge and competencies which they unconsciously transfer to parents and families (Shaw, Shiwakuv and Takeuchi 2011; UNICEF 2011; Dwiningrum 2017). It is also suggested that a more robust and comprehensive model for DRR curriculum should be developed internationally and a framework for sharing and reusing teaching materials should be established (UNISDR 2014; Apronti et al. 2015). To achieve this, the Sendai Framework for Disaster Risk Reduction (2015-2030) calls upon stakeholders, including civil society, volunteers, community, academia, scientific and research institutions, business, professional associations, financial institutions, and the media, to get involved in actions of resilience building (UNISDR 2015a).

The aim of this article is to introduce the Higher Education (HE) engagement model for DRRE and to evaluate the effectiveness of the pedagogy and the impact on students' learning. The objectives of the article include:

1. To illustrate the pedagogical approach of university engagement in community resilience building.
2. To evaluate the students' practice of DRRE delivered in Taiwan, in particular from the internationalisation and employability perspectives.
3. To provide recommendations for future practice.

**Universities engagement in the disaster risk reduction activities**

Academics are one of the key stakeholders of disaster risk reduction, it is expected that universities to play a more proactive role in DRRE; particularly in the areas of community engagement and wider society programmes (UNISDR 2015a). To date, the response of academia towards this agenda has been developing 'collaborative networks' of HE institutes in resilience building (Abedin and Shaw 2015). These have been promoted as the most effective approach with commendable success; for example, the Asian University Network for Environment and Disaster Management (AUEDM) and Periperi U in Africa play an important role in creating HE curriculum in DRR and community engagement (Halloway 2014). As summarised by Okamura (2015) and Oktari et al. (2017), the activities of these university collaborative networks include:

- Establishing disaster relevant courses, including environment management, development, human security, natural hazards: it identified about 100 universities globally run the courses at the master level (Holloway 2014). There is also increasing number of universities runs training for disaster risk reduction. For example, CORIS network has been working with the Knowledge Centre for Disaster Risk Reduction in the European Commission to promote DRRE.

- Networking with NGOs and governments: The Sprint Lab at Udine University (Italy) has been working with UNESCO since 2015 to promote school safety through sharing the concepts of safe school buildings in countries such as Indonesia, Laos, and El Salvador (Grimaz et al. 2015).

- Recording and sharing the experiences: In Japan, Iwate University have supported the Sanriku Region Recovery and long-term reconstruction post 2011 Great East Japan Earthquake; one of the missions is to educate and research on regional disaster prevention (Matsuoka 2015).

- Delivering suitable and reliable DRR education programme to communities: For example, universities in Taiwan have acted as trainers and experts to raise awareness of disaster risks in communities and schools under the government's "resilient community programme" from 2010 (Chou et al. 2015; Wang 2017; Tan and Lin 2018).

It appears that such academic engagement is limited due to poor resourcing and personnel (Halloway 2014; Shaw et al. 2015). There is a need to create more effective approaches and pedagogy that enhance universities' capacity to deliver DRRE in communities. One way of doing this is to involve university students in DRRE and community engagement. On the one hand, this proposal will increase the number of available trainers and broaden the involvement of universities in the community; on the other hand, it has been argued (Oyinlola et al. 2018) that the transdisciplinary learning approach utilised to engage students increases students' employability. The next section explains the pedagogical background of the latter.

**Using transdisciplinary learning approach to promote students engagement in DRRE**

Transdisciplinary learning approaches are becoming ubiquitous in higher education, mainly because the academe is more focused addressing relevant global challenges through multidisciplinary frameworks and developing intercultural engagement for students (Gibbs 2017). Transdisciplinary learning approaches aims to integrate skills and knowledge learned from various disciplines (Scott 2017), including learning from field trips, student exchange (study abroad), internships and placement. It is believed that a range of international professional, academic and cultural experiences can help students broaden their horizons and permit discipline and transdisciplinary based academic theories to be contrasted with practice (Kaufman, Moss and Osborn 2003). In an increasingly competitive labour market, students who can demonstrate international knowledge and understanding, as well as those possessing an international profile are considered more employable (Kratz and Netz 2018). Additionally, employers value global competencies, such as cultural awareness, language skills and personal adaptability (Crossman & Clark 2010; Van Mol 2017; Boyer 1995).

The number of university students participating in cross-border mobility involving multiple disciplines working on global challenges and learning is increasing (Jacob et al. 2015), hence most research focuses on internationalisation of the curriculum and encouraging student mobility (Holmes et al. 2016). However, this type of transdisciplinary education is often complicated (Gibbs 2017; Lozano et al. 2013). The underlying pedagogic understanding of how to support students' transdisciplinary learning experience effectively is required; in particular, pertinent pedagogical approaches focus on integrated learning are needed to support students' learning experience in this context (Huber, Hutchings and Gale 2005), for example, more interactive, problem-based learning and disruptive learning strategies (Holmes et al. 2016). The emphasis on integrated learning typically encourages students to engage with real-world challenges and to improve understanding of how academic knowledge and practice are interrelated.

Transdisciplinary education explores a range of issues, in addition to a good application of subject knowledge students have to engage with ideas around their personal beliefs and values, interrelationships, rights and responsibilities, human capital (political, social, cultural); as well as concepts relating to power, autonomy and capability (Gibbs, 2017; Shephard 2008; Steiner and Posch 2006; Lozano et al. 2013). The involvement of university students in DRRE and community engagement can be instrumental for employability and professionalism for students and is supported by sound pedagogical rational.

**Experience-based transformative pedagogy: a developing framework for HE engaging in community DRRE**

The University has had disaster management courses for over 20 years. To broaden students' engagement in the community, an optional academic module, entitled 'global experience in disaster and hazards resilience'which combined the field trip and placement to encourage level two undergraduate students to deliver DRRE in primary/junior high schools in a foreign context was introduced since 2013 (Chen and Blackett 2017). The academic module had provided opportunities for the students to develop inter-cultural competences, and employability skills (Chen 2017). It also aims to make connections between students' academic studies and real-world practice, as well as to promote DRRE in communities/schools. It also facilitated work-based learning and enhances global learning by learning through practice (Oyinlola et al. 2018).

The module integrates a series of lectures, a 10-day field trip, and an optional 4-12 week voluntary-based work placement which some students go on to take. To be eligible students needed to submit a CV demonstrating their theoretical knowledge and practical experience as well as pass a screening interview. Around 50% of the cost is funded by the course and Centre for Global Engagement within the University that promotes intercultural engagement and student mobility. Students also received free accommodation and lunch during their placement from the schools in Taiwan.

The learning outcomes of the module are to broaden understanding of how DRRE work is conducted in different cultural contexts; to support reflection on students' intercultural awareness and attitudes as they engage and co-operate with individuals during these activities. The optional voluntary-based work placement aimed to develop language skills and

other competencies and transferrable skills that are highly sought after in the global job market. The main task of the placement was to help schoolteachers deliver DRRE to children and community groups.

The module chose Chia-Yi County, Taiwan, as the site for field trip. Taiwan is located in a high-disaster risk area that is prone to storm, earthquake, floods and landslides (Prevention Web 2014). Jia-yi county and has experienced impact of many large-scale disasters (NCDR 2018). Although Taiwan began DRRE since 2007 to reduce the impact of disaster risks (Wang 2017; Chou et al. 2015), it has been identified that more DRRE should be implemented in rural and remote communities where educational resources are lacking (Wang 2017). The University has collaborated with universities in Taiwan to deliver DRRE in the primary and junior high schools in the remote areas in Chia Yi County wherein need of teaching resources (Chao at el. 2012).

- Pre-trip organisation

A series of lectures and seminars were organised to equip students with relevant professional skills and inter-cultural competences for attending the field trip and placement. First, students were introduced to Taiwan, including its geography, history politics, religions and culture. Students were also provided with an opportunity to take part in a free language course (Linguae Mundi programme) aligned with the module in order to improve students' language competence in Chinese. Since students only learned the basic level of Chinese, most of time, students had access to language translators when they deliver the DRR sessions in the schools A series of seminars were also organised to prepare students work placement, including developing teaching plans and skills for teaching and communication with teachers, schoolchildren and host families. The seminar also taught students to overcome the issues when a translator was not available during the teaching sessions, for example, using Google Translators and pictures/graphs to support the teaching. An online seminar was organised for students from both Taiwan and UK. This seminar allowed students to exchange their perception about the cultural and social aspects of working in Taiwan and provided students with an opportunity to establish new networks in the academic environment.

- Field trips design

The design of the field trip and placement aimed not only to enhance practical knowledge in disaster and emergency management, but also to facilitate international mobility, intercultural engagement, and disruptive learning/social learning/work based learning.

1. International mobility

The field trip included visits to professional organisations involved in disaster management, emergency planning, and post disaster reconstruction. Students also had a chance to observe spectacular geological phenomena of the island, including thermal pools, steaming volcanic vents, an active earthquake fault line, the site of recent landslides and reconstructed settlements for displaced people post disasters. Students were purposefully encouraged to use local transportation, including underground systems, buses, and taxis, so they could gain better understanding of the everyday local life.

2. Intercultural engagement

To embed the intercultural engagement aspect, students directly interacted with cultural 'others' via several methods:

- Online learning and on-site exchange: to enable students from both countries to gain better understanding of their respective cultures, an on-line learning session was organised before students met in person.
- Engaging in the communities: during the placement, students stayed with local people: either sharing apartment in the school/staff accommodation or in the students' houses.
- Facing 'clients' in another culture setting: UK students needed to learn very quickly the requirements of different education systems, for example, longer hours of study, and homework systems.

3. Optional placement: Disruptive learning / social learning / work-based learning

Students who took the placement were required to submit a CV and attended an interview with the UK project team. The project teams from Taiwan and the UK then assigned roles and locations based on students' responses. Students were supported to contact their schoolteacher to arrange the teaching programme and responsibilities before the trip. Before students started the placement, the project teams organised a seminar to enable students to meet head teachers and line managers of the schools in person.

The size of schools in Chia-Yi County varies; schools in remote areas may have only 30 pupils while others have up to 600 pupils. The university students were grouped in pairs in each school. They had to work together to prepare and produce teaching materials, meet schoolteachers and plan the lessons. Students also acted as assistant teachers to help deliver classes, such as Physical education, art and music. This allowed them to learn on the job from observing other teaching practices. They also had to work with Parents-Teachers-Association to organise events, for example, graduation and the accompanying celebrations, including banquets with communities. This kind of learning was disruptive for students used to classroom based teaching and learning; nevertheless, it provided an opportunity for students to develop social skills, including teamwork and interpersonal skills. Students had to overcome language barriers and culture differences through these new and sometimes complex interactions. These challenges were particularly highlights the effectiveness of the experience-based transformative pedagogy.

**Methodology**

The Kirkpatrick's (1994) model of evaluation was adapted as a methodological framework to examine the effectiveness of the experience-based transformative pedagogy. The Kirkpatrick's model was selected as it provided a rich and broad structure for investigating the learning, knowledge and long-term impact of the programme on students and the organisation. This evaluation design provides a thorough interrogation of different aspects of student learning, focusing on both discipline specific skills and broader interpersonal skills.

The four-levels of Kirkpatrick's evaluation consist of the following points (Kirkpatrick 1994: 54-57; Kirkpatrick and Kirkpatrick 2019):

1. Reaction: normally it examines how the learners react to the actual delivery, content and learning process. The project focused on the students' reflection on the pre-trip organisation and preparation.
2. Learning refers to the extent to which the learners gain knowledge and skills. The project highlighted three major skills that students learned from the project, namely, work-based professional knowledge, intercultural engagement, and interpersonal skills.
3. Behaviour/performance examined the capability to perform the learned skills while on the job. The projects emphasis the employability and global learning. This also examined how students apply what have learned pre-trip to their placement.
4. Results includes long-term features such as efficiency, moral, planning activities, culture, etc. The project evaluated the challenges from the pedagogy and social learning perspectives.

The adaptation of Kirkpatrick's model to evaluate the effectiveness of the experience-based transformative pedagogy of the project is presented in Figure 1 below.

1. **Participants**

Over the six-year period evaluated in this study, 127 UK students participated in the programme. 63 of the UK students participated in the extended placement. 41 Taiwanese students involved in the joint-fieldtrips who also acted as cultural ambassadors. The teams have delivered DRR training to almost 7,500 participants in Taiwan. Table 1 shows the total number of students involved in the programme from 2013 – 2018.

**Table 1 Number of students participated in the project and their impact on the DRRE**

2. **Data collection – instruments and analysis**

An extensive questionnaire was developed by the research team (two researchers): one is the module leader of the fieldtrip/placement, and the other is an educational researcher. Based on Kirkpatrick's framework, the questionnaire includes 66 questions aiming to understand students' experiences of the actual optional academic module and to explore the influence it has had on students since the intervention occurred. The questionnaire was targeted at UK students who have participated either in the field trip and/or the placement, and Taiwanese students who have participated in (part of) the field trip in the past 6 years. Historical pre and post event surveys used by the University teams between 2013 and 2018 was also used.

Students were recruited as participants via e-mail from the university administration. The research team sent students two emails over a period of three weeks. The email provided a link to a questionnaire, inviting them to participate in an anonymous survey. The University General Data Protection Regulations policy was adhered to and participation was voluntary. An inductive approach was used to conduct a thematic analysis of the survey data. The research team went through a rigorous process of identifying patterns of meaning in both data sets based on the evaluation criteria. Each researcher read the data carefully and coded

individually. The researchers developed themes from the coded patters and revised the themes together. Ethical approval was obtained through the University Ethics Committee.

**Using the adapted Kirkpatrick's framework to evaluate the effectiveness of students' engagement in DRRE**

Using the Kirkpatrick framework (Kirkpatrick 1994: 54-57) the results were organised into the four major categories of the evaluation approach. The first section discusses students' reaction to the organisation of the programme, followed by their learning experiences and the impact of this on the behaviour. Finally, the results with respect to delivering this type of intervention in HE are presented. The tables displayed shows the results of the questionnaire.

*1.      Reaction: The organisation and preparation for the project*

It can be seen from Table 2, that, most students agreed that the project aims were clear (77.8%) and they enjoyed the trip (95%). Most of them felt that they were well prepared for the experience (79%), indicating that lecturers provided sufficient information regarding the fieldtrip (89.5%) and strategically prepared the learning experience (94.5%). It is noted that some students did not feel adequately prepared for the experience for many reasons. The reasons given included: feeling lonely, missing family and friends in the UK, not being able to participate in many social events and not understanding the culture enough. This seemed to be because the students were not use to travelling on their own and had not anticipated the field trip to be so formal. Many other field trips are mainly social with few academic touch points. It highlights the importance of meticulous pre-trip preparation as the following student explained:

> "I really enjoyed the whole trip, starting with the field trip and followed by the placement I undertook. The support provided by key contacts within Taiwan enable a safe and well informed trip and allowed us to experience both planned and unplanned activities to explore Taiwan" (2015 CU cohort).

**Table 2 Questions around reaction: organisation and preparation for the trip**

It was also noted that sufficient peer support (79%) significantly contributed to a positive experience. "I believe student participation played a key role with supporting each other" (2014 CU cohort).

88.9% of students felt that accommodation was suitable. 77.8% felt the trip was affordable, because "great funding opportunities were provided by the University." (2014 CU cohort) One explains, "it was affordable for those doing short placements however if we had to provide our own food or stay a long period of time out in Taiwan, it was very expensive" (2017 CU cohort).

Although most students utilised the opportunity to participate in leisure activities during the project (77.8%), the feedback was mixed regarding having spare time to do other things because of the hospitality of the host families:

"I think we had plenty of time to do other things. Although due to the kindness of locals we were staying with, we did not have much 'me time' to relax. It was very full on. I think balance would be good of free time and social time. This being said we had great fun!" (2014 CU cohort)

On the other hand, some students found the local interaction enjoyable: "There was a good balance between academic endeavours and free time to explore" (2014 CU cohort).

There are difficulties to organise such project. As highlighted, funding is a major consideration for students who wanted to participate. In addition, the flexibility of the programme seemed to enhance the learning experience during their time in Taiwan.

## 2. *Learning:*

In the category of learning, three elements are discussed: work-based professional knowledge, inter-cultural engagement, and inter-personal skills acquisition. Table 3 shows the results of participants' view on their learning outcomes. We compared what students expected to learn and what they really learned during the fieldtrip/placement. The positive numbers displayed in the column "difference" means that students have learned more than originally expected; negative means that they have not learned as much as they expected before the trip.

### i. Work-based professional knowledge

Most students felt that they had a good balance of academic and non-academic learning experiences (89.5%). 10 learning outcomes were identified and students were asked to compare pre-trip expectation and post trip reflection on actual learning activities (see Table X). Students expected to learn knowledge related to community resilience (17.1%), Communication skills (15.7%), and Natural hazards in Asia (14.3%) from the project. Surprisingly, after the project, students revealed that they have learned the least about community resilience; however, they indicated learning more about people in low-income communities and how to work in these communities. It is noted that Taiwan has given up the 'developing country' status from 2018; hence, it is a developed country. However, the project has been working with schools and communities located in the rural areas with low-income and deprived resources. The have also learned about interdisciplinary working.

**Table 3 Students' reflection on their learning outcomes**

Table 4 shows how much students felt about they have learned work-based professional knowledge. Students felt that their practical skills had improved (84.2%). Particularly, students felt that they have learned about how to tackle global challenges (78.9%) and have the competence to deal with global challenges such as humanitarian relief management (84.2%). Many students indicated their learning improved because they have realised the scale of challenge, but still lack confidence. Because of the placement, they realised what they have learned is not sufficient and they need to learn more to cope with the challenge. They learned specifically about complexity of post disaster recovery/reconstruction, community

resilience and poverty reduction (88.9%). "If we are to work together as one community with global partners, then it should happen this century" (2018 CU cohort).

Students felt that real life experience enhanced learning:

"Seeing hazard and management first hand is vital in shaping my knowledge and understanding them better" (2018 CU cohort).

The project has demonstrated a positive link between academic knowledge and practical skills.

**Table 4 Questions around learning: work-based professional knowledge**

      ii.     Inter-cultural engagement

Interesting figures were observed in the inter-cultural engagement perspectives (Table 5). Before the trip, only 38.9% of students felt confident about travelling to another country, while 50% of students were nervous about meeting people from a different culture. In addition, their families also felt anxious about the travel (55.6%).

Students' perspectives had changed after their arrival. "The nerves died as soon as I met the welcoming Taiwanese, beautiful island and delicious food" (2016 CU cohort). The students from our partner university has also played a good role in helping UK students immerse themselves in the new environment. "The contacts we had with Taiwanese students provided a platform for clarification of doubts" (2016 CU cohort).

**Table 5 Questions around inter-cultural engagement**

Students' described the intercultural experience as very positive (88.9%); they learned a lot about the communities, including how aspects of everyday life social, political, economic, religious etc. interacted with disaster management and emergency planning.

> "We visited the Aborigines palace, touring the beautiful landscapes, visiting real life earthquake torn zones; [these] were remarkable and unforgettable experiences" (2016 CU cohort).

Although students had opportunities to interact closely with the students, teachers and people who live in the communities, only half of the students found that they knew more about the community (44.5%), or learned more about the culture, economic, cultural, social, and political dynamics of the communities they stayed (50%) . It would be interesting to explore why we had the results however, we only had a positive qualitative feedback: "I learnt a lot from talking to the students and spending time at their homes. They were engaging and it felt like we got to see the real Taiwan!" (2017 CU cohort) The students appreciated the holistic intercultural engagement, "Speaking to families around the town was the most valuable experience" (2013 CU cohort). 72.2% of UK students have maintained links with Taiwanese students they met through partnership, and developed collaborative networks with people in the agencies and communities as well. The interrelationships between UK and

Taiwan continues after the placement has completed and developed into friendships and community of practice, including working in partnership on international projects and employment.  Many students have returned to Taiwan to meet those contacts and vice versa.

iii.    Interpersonal skills development

Interpersonal skills were the most recognisable learning experiences identified by students (Table 6). Students felt that they were able to make decisions and express their opinions in a wide range of occasions (89.5%), including the lecture environment, community faced environment, and even to the media.

84.2% of the participants agreed that they are more confident about working in a multi-disciplinary team. 77.8% of the students felt that it was an advantage working with students from various disciplines.

> "The project has helped me adapt to a multidisciplinary team in my graduate job as a planning officer in a local authority and how to communicate effectively with colleagues and clients of different disciplines" (2017 CU cohort).

International skills are acknowledged in the global job market and having a structured learning experience highlights specific skills and attributes for potential employers. It is clear that the project has helped students to recognise and develop these skills.

**Table 6 Questions around inter-personal development**

Students were asked to compare four learning outcomes. They felt that they had learned most in the areas of cultural awareness (29.8%), worldview (28.1%), and academic subject matter (17.5%). Although students have not realised that they have learned the skills of applying academic knowledge to real-world context, these are particularly advantageous in the disaster management disciplines.

**3.  *Behaviour:***

i.    Employability

Table 7 displayed the results related to 'employability'. Students indicated that Taiwanese experience improved their employability (84.2%). Even though 15.8% of them found it difficult to articulate their experience with respect to their employment, most students felt the programme has influenced their personal development/career development and enabled them to think about how to utilise their degree (88.9%). "This trip helped me to successfully secure a job for my placement year" (2017 CU cohort). "My potential employer recognised the experience as valuable" (2016 CU cohort). "The experience was discussed heavily in my graduate level job interview" (2016 CU cohort).

Students felt that their work has made the Taiwanese communities better prepared for disasters (61.1%).

"We provided new ideas towards the early warning application and an overview of the UK's emergency service structure. Also benefitting school children by educating them, teaching Basic English and earthquake preparedness" (2017 CU cohort).

55.5% of students said they have acquired transferrable skills such as developing and designing innovative products after the field trip/placement. "Currently work with International Citizen Service on sustainable development projects" (2013 CU cohort).

**Table 7 Questions around employability**

ii. Global learning

There was a strong correlation between the programme and the global learning agenda in HE (Table 8). Though this was not identified before the trip, the experience had a long lasting impact on students' worldview, their self-awareness and understanding of globalisation.

"Awareness of, for example emissions and global warning consequences is a mitigation step towards floods, landslides, etc. Also important is the exposure of Taiwanese to western/British culture" (2016 CU cohort).

"Using the experiences gained in the fieldtrip helps to gain a better understanding of how other cultures are differently prepared for disasters and through the trip, you have contacts that could help further knowledge on certain topics" (2018 CU cohort).

Students also appraised the benefits of cross-cultural experience. "Cross cultural information sharing is usually very valuable" (2013 CU cohort). "Adapting to different culture whilst working with a multi-disciplinary team" (2017 CU cohort). "I know nothing about Taiwan/Taiwanese. I learned not be judgemental. Post Taiwan trip, I have been applying for jobs in Taiwan" (2016 CU cohort).

The project provides students with an opportunity to see the arrangement of DRRE in a different cultural settings and this exposed them to learn from others and incorporate new ideas in their practice in the UK.

**Table 8 Questions around global learning**

*4. Results: challenges – pedagogy and social learning*

The fourth evaluation phase of Kirkpatrick's model is to evaluate the impact of the project (results) – how students transfer their learning experience to their personal development and career (Table 9). The direct impact of the learning is that students stated they would like to participate in other international trips (88.9%) and transdisciplinary projects (83.4%) in the future. Most of them felt that they could have a positive influence in the world (83.3%).

"The experience was fun, knowledgeable and overall fantastic. It developed me as an individual and made me feel more confident. It allowed me to see hazards first hand in different communities/cultures and understand the people. It is an experience that I would love to participate in again" (2018 CU cohort).

Students had an opportunity to reflect and consider ways to promote change in the professional context, "it helped me to understand topics that still need to be developed further in the UK for better disaster preparedness/management" (2018 CU cohort).

Although more than 40% of students answered strongly disagree or neither nor agree to the question of "I have done some practical activities around developing and designing innovative products/services since the project; one replied that "currently worked with ICS on sustainable development projects"(2013 CU cohort). It is noted that most of the participants were recent graduates and just secured a job. Many students indicated that the placement was the only opportunity for them to carry out practical work in the real world; this shows the importance of the pedagogy to give students hands on opportunity to enhance their employability outside of the campus environment.

Finally, the field trip and placement opportunities enabled students to

"…learn about how different cultures, communities and governments work in ensuring the fullest safety of their citizens during times of crisis or disaster is important in bringing the knowledge back to help develop the system in the UK better. It also gave me a better understanding of how other communities that have been affected coped with it" (2018 CU cohort).

It is evident that the project has introduced students to the concept of global challenges and the joint responsibility of communities to promote better solutions for disaster risk reduction. Students discussed and understood their roles as global citizen and acquiring global leadership skills.

**Table 9 Questions around pedagogical and social learning challenges**

**Discussion**

The article began with a discussion on the need of DRRE at all levels of the society and followed with identifying the need for universities to get involved in the DRRE, not only in support of delivery training to communities, but also in enhancing DRRE as part of Environment Education within HE. The impact of hazards and risks can be reduced with better understanding of the causes and methods of mitigation (UNISDR 2005). Following the analysis and interpretation of the results of the questionnaire, the following three key points are observed:

*Bottom up approach for collaborative networking in DRRE*

The project utilises a bottom up approach to enable collaborative networking between universities and relevant stakeholders in the communities, including schools, families,

residents and local authorities. The friendly nature of Taiwanese people facilitated the establishment of the network. This connection has enhanced disaster resilience as recommended by the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR 2015a). The University's proactive approach has broadened the engagement with communities, and improved DRRE. The involvement of university students to deliver DRRE as part of risk communication has had a positive impact on the numbers of people engaged in DRRE. Over 7,000 school students / community residents have received the training.

### *Disruptive learning in HE*

The inclusion of the field trip and placement in the HE curriculum provides students with stronger employability skills such as work-based professional knowledge, including community resilience, communication, and regional risk and hazards. Interpersonal skills were also enhanced, for example, worldview-interpersonal perspectives, and teamwork. Positive results were shown in the Tables 3 to 6, as discussed in the previous sections In addition, when we asked what was the most important thing that you learned on the project, responses include: "Seeing/understanding the hazards and management first hand is vital in shaping my knowledge and understanding of them better" (2018 CU cohort). "Community work" (2014 CU cohort) and "how to work together in a cross cultural team" (2016 CU cohort). One of the respondents said "I knew nothing about Taiwan; I learned not to be judgemental. Post Taiwan trip, I have been applying for jobs in Taiwan" (2016 Cu cohort).

From a pedagogical perspective, the model developed by the University to support students learning experience can be shared across the sector. Firstly, as indicated in the results, it is important to have robust preparatory seminars that include intercultural awareness: language skills, political, socio-cultural context. This is to help students to prepare mentally, emotionally and even ontologically for cross-cultural field trips. Furthermore, the programme has challenged students and exposed them to 'real people' using online learning and on-site exchange and this has enhanced their collaborative learning competencies, problem-solving skills as well as self-regulated and self-responsible learning (Oyinlola et al. 2018). Essentially this type of learning activities requires students to be both dynamic and socially cognisant learners, utilising not only analytical capabilities but also communication skills, creativity, flexibility, negotiation and reflexivity – very specific social competencies that are not necessarily required in the classroom (Adefila et al. 2018).

### *Global learning*

It is important to highlight how real world experiences such as intercultural engagement are an irreplaceable part of the programme. It is common for HE to use classroom-based simulation and virtual world learning environment to deliver teaching content. However, this programme underpins the complimentary nature of work-based, disruptive learning that help students to recognise how to transfer subject based knowledge to the real world scenarios (Jakubowski 2003; Gibbs 2017; Achen et al. 2019). This can be disruptive for students but clearly pragmatic and constructive for long-term development (Oyinlola et al. 2018). One challenge to raise is the financial consideration. Although half of the cost of the field trip was covered by the university and students received free school lunches and accommodations during their placement period, it could be expensive for students.

In addition, the programme does not only facilitate the DRRE, but also provides a sound pedagogical approach for intercultural learning in the HE. The model utilised include three major considerations:

1. Link very carefully students learning needs with cultural engagement and allow for disruptive learning which enables reflection.
2. Integrate subject matter learning experiences into intercultural awareness so that students have holistic learning opportunities.
3. Prepare students to be resilient, engage with discomfort, be reflexive, and develop capacity to see the world through different lenses.

To ensure the transdisciplinary approach is robust it is important to incorporate reflective experiences within the learning contexts (Scott 2017); in order to empower students to articulate their rich experiences and embed the skills they develop in their own practice. Furthermore, students will benefit from a richer understanding of how to continue to enrich their experiences with a view to showcase the learning in structured ways within personal development plans. The survey showed that a number of students have not been able to adequately transfer this learning experience to their employment.

This study broadens understanding of how to improve the depth of DRRE in communities by developing the students training to be practitioners in this arena and simultaneously enriching the learning experience of the learners using a structured transdisciplinary learning approach. The study does not incorporate an evaluation of communities' experiences, particularly the different layers – the young students, their teachers and parents and the general community; this limitation can be addressed by further research. In addition, the study highlights the need to follow up with students to find out the medium and longer-term impact of their learning. This could be helpful to gain better understanding about how students integrate this experience within their personal development. To understand both the short-term and long-term impact on the community of the DRRE programme, it is recommended to carry out follow up research to identify the change of behaviours of the school children and residents in the communities the programme has engaged with.

**Conclusion**

Including DRRE in the HE curriculum benefits both communities and students. It has been argued that HE institutes should engage with local communities to maintain a sustainable impact on the society; further, institutes should extend their scope and impact to national and international organisations. Universities, especially those specialising in disaster management, can play a lead role in DRRE in communities. This article shows the positive impact including a specialist DRRE programme has on student learning and employability. Furthermore, from a DRRE perspective widening the engagement of HE and collaborative networks amongst universities around the world will support the principles outlined in the International DRR framework. This will establish a comprehensive and holistic approach to DRRE globally.

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