Policy Brief:

Open Online Learning Platform targeted for Digital Transformation in Education for DRR

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Background

Communities around the world are facing disaster, resulting in loss of life and habitats on a large scale, and hindering sustainable development in many countries. The term disaster risk reduction (DRR) emerged as a topic of interest in the worldwide education systems to develop awareness and state-of-the-art mitigation techniques with regards to global disasters. Twigg (2015) highlights the scale of losses caused by disasters between 2003 and 2012, stating that the data are overwhelming. His data suggests that, on average, 106,654 people have died and 216 million people have been affected, with average losses of $157 billion during this period globally. In relation to the 2004 tsunami disaster in south and south-east Asia, Shaw et al. (2012) highlighted lack of awareness on DRR among the public as a major restriction for mitigating disaster impacts. Shaw identified that organisations closest to the affected public (i.e., non-government organisations (NGO), community-based organisations (CBO) and local community groups) lack access to up-to-date knowledge resources coming through universities to address local disaster risks. It has, thus, become essential to reinvent methods for effective knowledge transfer from universities to relevant community organisations and industries, which aids in reducing disaster impact. In theory, the scale of catastrophic losses can largely be reduced by early safety actions, which are unseen among communities in developing countries.

Over the years, several DRR education-related studies have been published on cause-related marketing for DRR in the tourism industry (Aliperti, 2018) and conceptual frameworks (Faulkner, 2001; Ritchie, 2004; Mistilis & Sheldon, 2005; Agustan 2019). Research has implanted the idea that DRR-related education is well spread within worldwide education systems and well absorbed by the higher education institutions (HEI). Particularly, Shaw's (2012) report highlighted that HEIs must play a major role in distributing DRR education compared to school or family/community education, which are the most conventional mediums. They discuss the importance of forming collaborative alliances between academic institutions, governments, and NGOs for the success of DRR. Although DRR is well researched, Shaw highlights a barrier to sharing this knowledge with the industrial and/or corporate bodies. In fact, technological and infrastructure developments have been delayed in contrast to other DRR-related studies due to a stagnation of knowledge transfer from HEIs to the industry.

So far, the most conventional and effective methods for DRR education have been through first-cycle (i.e., bachelor's level) and second-cycle (i.e., postgraduate or

research level) education. They usually rely on in-person and teacher-centric forms, thus limiting the education from reaching far beyond the student cohorts. Moreover, traditional educational patterns are restricted to tacit knowledge transfer, excluding second-cycle research outputs, which are rarely reached to local communities. With the ever-changing nature of natural disasters and the traditional disaster prevention knowledge coming from local communities, the need for an open, highly available and easily accessible knowledge sharing mechanism is identified. One such form is open education provided via online learning platforms, which are accessible as both paid and free online courses. The term "open education" conceptualises "a way of carrying out education, often using digital technologies. Its aim is to widen access and participation to everyone by removing barriers and making learning accessible, abundant, and customisable for all" (European Union Science Hub, 2022). The authors have identified that such a platform will be usable for the purpose described above, with relevant modifications. Aligning with the discussions above, Output 3 (O3, hereafter) of the project INCLUDE (INCLUsive Disaster Education) is formulated to develop an open online learning platform to to enhance digital transformation in education for DRR.

Technological considerations for system design of platforms for digital transformation

Accessibility and security have the largest impact on infrastructural aspects of the design because system scalability and availability (i.e., how many people can access the system without issues at any given point in time) are largely affected by the type of infrastructure used, while also being critical for providing security for underlying data and resources. User interface/experience (UI/UX), cross-platform and multilingual elements demand quality in the outermost layer of the system design, while scalability and concurrent/fast-access elements speak for the innermost layer. In contrast, good coding techniques and frameworks are effective in delivering a robust outermost layer while physical infrastructure resources for hosting the platform must be held responsible for the system backbone. However, for best practices in security, both outer layer and innermost backbone are equally decisive. Listed below are the technological choices made during the system design phase after careful consideration of aforementioned details.

- Website user interface
    - JavaScript – undeniably critical for web applications.
    - HTML and CSS – undeniably critical for web applications.

- Laravel Blade – a framework compatible with the backend code.

• System backend

- PHP Laravel – highly popular, secure web framework suitable for our use case.
- MySQL – highly popular database engine, seamlessly compatible with Laravel.

• Infrastructure

- Azure VM – widely used, highly available and highly scalable cloud server infrastructure from Microsoft Cloud Services. This is a GDPR compliant service that is secure and trustworthy to be used in research.

Further, the following were identified as other technological considerations for design of platforms for digital transformation:

1. Inclusivity: Our proposed model has inherent characteristics to provide unrestricted education for every learner across the world through openness of the model. In contrast, any participant joining a learning course are not necessitated to fulfil any pre-defined demographic or geographic criteria. It is completely open and free of charge for everyone, and we have made sure the inclusivity is well retained within this model.

2. Flexibility: Even though our system is centralised within this platform, it provides fully asynchronous learning. The fact that no course forces learners to obtain certificates or complete a course within a timeline ensures the asynchronous nature. Also, integration of external social media allows more flexible means of engaging in conversations. Moreover, the newsletters feature allows participants with limited internet access to receive knowledge via less sophisticated mediums, such as emails or postal services. It is up to the course facilitators to handle these arbitrary mediums of knowledge dispersion, though the required facilities are made available within the platform.

3. Accessibility: This is also a major design aspect we have considered within our hub-spoke model ensuring better accessibility for course learners across the globe.

4. Interaction based: Core principle of our model is based on connectivist learning paradigm, which inherently allows high levels of user interaction in learning and knowledge generation.

5. New technologies: We have not efforted to integrate new technologies, although via the video posting mechanisms, we believe novel drone technologies (specifically live video streams) can be attached to the courses. We expect future studies in this learning model to better integrate AI and other latest technologies to improve learning experience.

6. Co-created/Feedback based: We believe this criterion is also fulfilled by the connectivist nature of the model. In addition, our system allows courses to be co-hosted by multiple facilitators, with new knowledge considered to be co-created by all participants, introduced as knowledge generation. Also, the ability to comment and reply comment on each new post by learners is a way of receiving feedback on their content. However, proper feedback mechanisms in relation to courses would be an important addition.

7. Privacy considerations: Our platform has ensured full privacy of its users through adherence to GDPR guidelines and the IT infrastructure utilised, which are are fully conformant with user privacy considerations. Furthermore, access restrictions and permissions mechanisms integrated within this platform allow better security against any sensitive resources hosted within the platform.

8. Learner centred: The utmost important and the core concept of our model is learner-centric education, and we ensure this criterion to be utterly fulfilled.

Policy recommendations

With regards to the platform of choice, we have further identified a key set of high-level criteria that must be satisfied from it. Firstly, it should provide an open, free and safe space for collaboration between the participants. In this context, collaboration refers to contribution to the shared knowledge pool and absorption from it. The safe space is essential because of the involvement of various sensitivity levels of shared knowledge, intellectual-property (IP) rights and so forth. Secondly, it is essential to remove teaching boundaries by introducing learner-centric education. Conventional teacher-centric education lacks knowledge generation and restricts learners within a frame by means of curriculums. On the other hand, learner-centric courses freely evolve and culminate on the participants knowledge, which is beneficial in open access environments. Thirdly, there should be a learning content management system through which tacit knowledge transfer happens. This system helps evolve the learning techniques within the community at the initial stages where participants lack common knowledge on the subjects, which is essential for active collaboration at later stages. For that, DRR researchers,

industry partners and university lecturers are provided a tool for content sharing, and the open community procures its benefits. Finally, the platform is expected to reach a wider audience via the use of social media, blogging sites and other open communication mediums. This would facilitate implementing the learner-centric concept, increase the platform's popularity, widen the knowledge reaching boundaries, and consequently, protect the platform's sustainability. Policy recommendations for designing platforms for digital transformation in education for DRR are:

1. The built platform needs to allow users to form local clusters among communities as it is important to generate and spread localized disaster information/knowledge. This is normally facilitated via external social media platforms but there has to be a mechanism to create linkups between each platform.

2. Ability of the platform administrator to manage access to a range of institution types and institutions provides a crucial element for collaborative learning between universities and industry while mitigating privacy and confidentiality concerns.

3. Providing a clear and concise manner through which roles and permissions of each user is defined within the platform builds a hierarchy among regular learners, course providers and administrators.

4. Mechanisms to retain and grow the numbers of active collaborators within the platform; these will depend on the context and various methods can be applied such as rewards, recognition badges and content ordering algorithms (better contents always appear on top giving authors satisfaction)

5. Platform must feature in the global stage, and this can be facilitated by marketing procedures and SEO (search-engine optimisation) techniques allowing more people to become aware of the platform and find it easily through internet.

6. Same as above, higher social media presence can also be attributed to platform's popularity.

7. Emerging technologies – drone video streams, AR/VR facilities to augment or virtually visualize real-world scenarios, and IoT (internet of things) for real-time data collection and analysis from various physical locations around the world.

8. Platform should facilitate continuous growth from participant numbers perspective – this can be facilitated by better IT infrastructure that does not allow failure and seamless replication of resources.

9. Another aspect of IT resources and performance can be attributed to massively concurrent and fast user access facilitation. This is critical to retain user bases without giving unsatisfactory experience using the platform.

10. The platform needs to facilitate secure mechanism to protect sensitive content being shared among academics/institutions within the platform as research collaborations often feature such material.

11. Optionally, multilingual learning facilities can be implemented, which will eventually enhance the size of user bases and reach a wider population.

12. Optionally, the platform can be integrated with external data repositories for enhanced research collaboration.

13. The platform must have an isolated administration portal, to which only administrators have access. This portal can be used to manage everything within the platform ranging from users and institutions up to learning courses and discussions.

14. Accessibility and user-friendliness must be accounted, which helps user-retention. Cross-platform access is an important enhancement such that users can access the platform through both computers and mobile devices.

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Further reading

Shilpage, W. R., Liyanage, C.L., Yapa, R., Jackson, E., (2023). Digital Platform for University-Industry Collaborated Learning for Inclusive Disaster Education, A report as part of Output 3 of the INCLUDE project: Inclusive Disaster Education.

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