

eLearning tools for Public Awareness Programme Education in Disaster Risk Management: Case Study of the City of Cape Town Disaster Risk Management Centre

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Publisher details: Proceedings of the 8th International Conference on e-Learning Vol.2. [Online]. <http://academic-bookshop.com>

Abstract- Disaster occurrence around the world has in the past few decades increased at an alarming rate necessitating an urgent need for mitigation strategies. As a result, research has indicated the usefulness of Information Communication Technology (ICT) in disaster risk management. Furthermore, ICT generally plays a critical role in all aspects of disaster risk management such as: early warning prediction; informing and circulating information relating to disasters to communities especially those at risk as promptly as possible and providing communication structures immediately after a disaster occurrence. As part of its planning and precautionary measures in responding to disasters, the City of Cape Town Disaster Risk Management Centre (CoCTDRMC) implements public awareness programmes across the city. The most acclaimed is an annual awareness programme especially for high school learners selected from various schools across the city. The learner participants are expected to act as change agents in their communities. In 2012, learners from twelve different schools across the city benefited from this programme. They were expected to educate families, friends, schoolmates and communities generally on the topical issues surrounding disaster risk management.

This study uses a case study approach. Since the target audience of the programme is the youth, there is need to shift towards utilising ICT. The aim of this paper is to look at how eLearning as an ICT tool can be integrated in the implementation of Public Awareness Education Programme (PAEP), so as to target broader audience and create an increased capacity building across the City of Cape Town (CoCT). The examination considers providing tools that are accessible, dependable, resilient and flexible among the residents so as to reach the grassroots levels where communities are mostly affected. The paper considers a combination of tools so as to support behavioural change. Some of the research findings are that, the 2012 programme was very beneficial and successful. Henceforth there is need to target a broader audience, and although the CoCTDRMC does make use of some relevant ICTs, there is need for additional and upgraded technological resources. Also pertinent is the fact that eLearning can play a major role in making sure that a broader audience is reached if applied effectively. The findings of the research are of relevance to the CoCTDRMC and other municipalities across South Africa. The Centre for Innovative Educational and Communication Technologies (CIECT) at the University of the Western Cape can also use these findings to develop and implement an eLearning course for both employees of CoCTDRMC and other interested community members. This will guide them on how eLearning can assist in fostering a successful implementation of PAEP across the city.

Key terms: eLearning, Disaster, Disaster Risk Management, Information Communication Technology, Public Awareness Education Programme.

1 Background

The severities of disasters in the recent years have proven beyond reasonable doubt that, the governments and other policy-makers across the globe need to do more. This has called for more ways of making sure that, communities and properties are prevented from destruction or death. One of the major ways has been to work towards ensuring that communities are resilient, by especially informing them on disaster related matters. ICT has been defined as a major role player in such efforts, as it facilitates positive change across all levels. The thrust of this paper is to discuss how eLearning as an ICT tool can be integrated by the CoCTDRM in its PAED so as to reach many people. Tools such as mobile devices, radio and social media (facebook, blogs, twitter) are widely

available at grassroots levels, therefore the research emphasises that if these tools are properly utilised they can generate a major difference.

2 Literature Review

A literature review can be simply understood “as a description of the relevant literature on a particular field or topic” as defined by University of Canberra (2006). Kennedy (2007) indicates that literature review is globally accepted as a field of scholarly writing though it is still not clear what constitutes a body of literature. He further relates this argument to the fact that, it's the writer who has the responsibility of determining what to include or exclude in the content. The topics used for this review were; eLearning, disaster, Disaster Risk Management and Information Communication Technology (ICT).

2.1 Defining eLearning

Research shows that, the concept eLearning can be understood differently by different people and this can be determined by particular professional approaches or interests. Some researchers argue that eLearning can be viewed as a natural advancement of distance learning that aims at making use of new technologies in education, or also a new generation of distance education (Sangra, Vlachopoulos, and Cabrera 2012:146; Herridge Group 2003). Stockley (2012) in his blog supports the definition of eLearning above by saying that, as a concept eLearning can be defined differently by different people. He further defines eLearning as the “delivery of a learning, training or education program by electronic means”. Such may include computers or electronic devices (e.g. a mobile phone) in some way to provide training, educational or learning material. The researcher notes that, eLearning tools go beyond using computers to include MP3 players, podcasts, blogs, online social networks, blogging and downloading music and video, daily or weekly blog, e-mail or text messages, online forums or visiting a private chat room, USB flash drive, videos or presentation of assignments. In relation to this research, such tools can play major part in increasing community engagement towards increasing societal resilience in public awareness education. Authors with similar views include; Fry (2001), who views eLearning as, “delivery of training and education via networked interactivity, and a range of other knowledge collection and distribution technologies”. Additionally, Herridge Group (2003), views eLearning as the use of internet or wireless technologies with an aim of improving knowledge, and performance where need be. As a result for eLearning to be successful, it needs to be implemented carefully so as to avoid failed projects as it's a means to an end. From the above views, the researcher cannot fail to identify that, in the process of different authors trying to look for different understanding of eLearning; the most outstanding concept within eLearning is the term technology and transfer of knowledge.

During eLearning implementation, learners or participants can either experience learning at the same time (synchronous) or at different times (asynchronous). This creates more strength compared to when it happens at different levels. This then brings us to some of the benefits of eLearning: the content is always available and reliable (learners can finalise at their own convenient time); learners are put at a control level; one may not need to travel far especially if they have access to internet and computers at home/school hence reducing travel costs to attend learning lectures; consistency of content (quality or effectiveness) as same learning is made available to anyone, anywhere at any time; eLearning serves large number of people who might be at different parts simultaneously (Herridge Group 2003).

Compared to traditional ways of content delivery, eLearning becomes cost effective as it's readily available in digital format. This cuts down printing material which consequently is a positive impact on the environment. When linked to “broadening of learning context and learners' communities”, it results in tolerance and acceptance for groups at risk of social segregation (Herridge Group (2003; HELIOS 2007:4). This implies that communities that have limited number of schools can also rely on eLearning to avoid travelling long distances. Wong (2007) points out that, many people pay more attention to benefits of eLearning and not its disadvantages. He further provides some limitations of eLearning as those that relate to technologies, personal issues, comparison with traditional campus learning and design issues among others (Wong 2007). Evan & Hasse (2001) states that eLearning needs one to have computer skills therefore, limited to those who have skills. This limitation means there may be unexpected incurred training costs. A high level of discipline is required as the learners are expected to be self-directed. Another major challenge is the availability of bandwidth and necessary resources. There is also a lack of face to face integration which may limit the sharing of

ideas. Wong (2007) indicates that such limitations can be considered so as to avoid the failure of projects.

2.2 Disaster, Disaster Risk Management and Information Communication Technology (ICT)

2.2.1 Concept disasters

Disasters can be described as any occurrence of activities that pose serious threats to the health of communities by disrupting the normal way of lives or even causing casualties (Eyre., Fertel., Fisher. & Gunn 2001; United Nations 2004). Davis & Seitz (1982:547) defined disasters as extraordinary physical events that attain human significance through the socio-political contexts in which they occur. In addition, there is always a need to note that what exceeds the coping capabilities of one society may be commensurate with those of another and, hence, that physically similar occurrences may exhibit widely different effects from place to place (Davis & Seitz 1982). Statistics, for example show that in the year 2011, 332 natural disasters were recorded compared to the average annual disaster frequency observed from 2001 to 2010 which totaled 384. On the other hand; the implications in the year 2011 on both human and the economy were enormous. Death rate was approximately 30, 773 on people and caused 244.7 million victims worldwide. On the economic side, damages from natural disasters were the highest ever registered, with an estimated US\$ 366.1 billion (Guha-Sapir., Vos., Below & Ponserre 2011). Such statistics are extremely frightening and it can generally be argued that, the occurrence of disasters around the world has in the past few decades increased at an alarming rate. It is without doubt that this has necessitated an urgent need for mitigation strategies.

2.2.2 Disaster Risk Management

Disaster Risk Management according to Himayatulla and Abuturab (2008:5; UNDP 2007) is viewed as the sum total of all activities, programmes and measures which can be taken up before, during and after a disaster in order to reduce impact or recovering from its losses. Accordingly, there are always efforts towards minimising negative effects that can be caused by disasters such as proper planning; mitigation and impromptu actions. The three key stages of activities that are taken up within disaster risk management are; pre-disaster activities; mitigation and preparedness activities, emergency response activities and lastly response and recovery activities. Himayatulla and Abuturab (2008) noted that pre-disaster activities are those which are undertaken to reduce human and property losses caused by a potential hazard. For example, carrying out awareness campaigns, strengthening the existing weak structures, and preparing disaster management plans at household and community level. Such risk-reduction measures taken at this stage are termed mitigation and preparedness activities. During a disaster, these include initiatives taken to ensure that the needs and provisions of victims are met and suffering is minimised. Activities taken at this stage are called emergency response activities. Post-disaster activities refer to initiatives taken immediately after a disaster strikes, and in response to a disaster, with the purpose of achieving early recovery and rehabilitation of affected communities. These are referred to as response and recovery activities. Such activities link with each other and therefore the application of ICT becomes very relevant across all levels of disaster risk management.

2.2.3 Information Communication Technologies (ICT) Roles in Disaster Risk Management

The role of ICT in Disaster Risk Management (DRM) cannot be questioned and is not a new area of discussion. Disaster Risk Management activities are largely driven by risk information and such information is always relevant (Sabat Undated; EUMETSA 2009).

This argument is supported by organisations such as InfoDev (2009), which points out that there is a relevant body of research on the value of ICT application in DRM. On the other hand, such recognition of ICT and its application in DRM has not been possible in some countries due to certain challenges. For example, research has indicated that one challenge is the failure of some governments to implement ICT friendly policies, which in turn slows efforts towards disaster risk reduction (UN-APCICT/ESCAP 2011). Other reasons include limited resources and high cost of equipment (example in Africa). At local levels, Simons, Vahed and Moodeley (2009) specifies that, in South Africa one of the disaster reduction challenges has been the dependence on outdated ICTs. Therefore, the discussed issues may imply that successful utilisation of any ICT tools in disaster risk management (as discussed below) is generally measured against its effectiveness and advancement.

ICTs in *mitigation* promote collection and analysis of data, as well as the development of risk information products. These products include: risk zones maps; site selection for infrastructure and mitigation plans. In cases of advanced ICTs these products can also play a role in managing and mitigating disasters by supporting data collection during decision making, as well as during communication and collaboration. Such advancement is in the form of Internet, GIS, Remote Sensing, and Space Technology; and also reduces the challenge of ineffective management of technology in disaster risk management (Sagun 2010). In addition, ICTs in *disaster preparedness* supports data collection on different information. This is done through television and radio broadcasting, web portals, long-distance education and telecommunications creating disaster mitigation (UN-APCICT/ESCAP 2010); Munodawafa J 2008).

ICTs in *disaster response and relief* operations provide a simple information system to those individuals in charge of response (and other relevant agencies and professionals). Hence, ensuring relevant information is collected and communicated effectively to the public. Therefore, the right ICT infrastructure must be in place (UN-APCICT/ESCAP 2011; (Laughton Undated). Such tools may include; amateur radios (VHF, UHF, HF), fixed lines using wireless, satellite telephones, fax and Internet/emails (Nelson 2009). Besides, the main role of *recovery and reconstruction* is to improve services for the affected communities. This is achieved by ensuring that there is minimal confusion and an increased collaboration between response agencies and those affected.

The table below provides an example of some of the ICTs that have been applied in Asia and the Pacific in Disaster Risk Reduction (DRR) efforts.

ICTs tools applicable in Disaster Risk Management

| ICT Application | Benefits | Limitations |
|--------------------------|---|---|
| Cell Broadcasting | Not affected by traffic load. Will not add to congestion. Messages can be differentiated by cells or sets of cells. Greater authenticity of message. | Reader must be literate. Phone must be switched on. Phone must be set to receive cell broadcasting. |
| GIS and Remote Sensing | Needs constant monitoring. Spatial presentation of data. Facilitates cooperative effort. | High bandwidth needed. High-speed networks required. Costly hardware and software Demands skilled professionals. Difficulty capturing qualitative data. |
| Internet/Email | Interactive. Multiple sources can be checked for accuracy of information. | Low penetration rate. Must be literate. Internet content in local languages may be limited |
| Mobile Phone (Text SMS) | High penetration rate. Easy to carry. Relatively low cost. | Must be literate. No indication that message is generated by a legitimate authority. Subject to congestion and thereby delay. |
| Radio | One-to-many broadcasting. Does not require user to be literate and is Portable. | Less effective at night. One must own one |
| Satellite Communications | Independent of terrestrial communication network that can be damaged by natural hazards. | High cost of systems hardware and bandwidth utilization. Unlikely to work indoors. |
| Telephone | Does not require user to be literate. | Inadequate penetration rates. Congestion of phone lines during emergencies. Disasters can damage infrastructure. |
| Television | One-to-many broadcasting. Does not require user to be literate. | Less effective at night. One needs to have access to one |

Figure: 1. The Advantages and Disadvantages of Selected ICT Applications (UN-APCICT/ESCAP 2010:22-23)

The above tools may vary at their degree of effectiveness in different parts of the world. This will be determined by certain infrastructures that are in place and seriousness of those in charge. For example radio transmitters and mobile networks must be working effectively.

3 Methodology

A case-study approach was adopted. A case study, according to Yin (1984:23), is defined as empirical research that examines a contemporary phenomenon within its real-life context. In addition, the case study method is an approach to studying a social phenomenon through a thorough analysis of an individual case. Past case-studies provide researchers with an opportunity to explore and understand complex issues (Zainal 2007). Kothari (2004) explained that the case study method is a form of qualitative analysis where careful and complete observation of an individual or a situation; or an institution is done.

The City of Cape Town Disaster Risk Management Centre has been chosen for the case study through which to expound the issue. The DRMC was chosen for several reasons. Firstly, the city faces an influx of people migrating from different provinces as well as from other African countries, leading to the growth of wide-spread informal settlements, which are more vulnerable to disasters. Recently in 2011, Cape Town was the only city in South Africa to be granted, "Role Model City" status (Pillay 2011). Despite this recognition, Cape Town is disaster prone, with several disasters ravaging throughout each year, making it a suitable case study area. This case study relied on both literature review and qualitative methods. These included online journals, blogs and discussion forums. In addition, 105 closed-ended questionnaires were distributed to high school learners who took part in the Public Awareness Education Programme in the year 2012. Ninety-two (92) learners completed the questionnaire. A total of 10 open-ended questionnaires were distributed to the top management of the CoCTDRMC. Within the questionnaire, there was a question on the implementation of ICT in the DRMC. Furthermore, the researcher distributed 10 open-ended questionnaires to the volunteer coordinators who work at DRMC. This group of people operates on the ground (within communities); hence their participation in the research was crucial.

4 Research Findings

Public awareness is aimed at ensuring that communities are aware of hazards around them. This enables them to stay resilient, by enlightening them on possible measures of saving their own communities from disaster-related occurrences (Hays 2012).

Public awareness efforts, if effectively implemented, may assume different forms such as: national public awareness initiatives; special events and major activities; the role of the media; and the experiences of local communities (United Nations 2004:282). Both legislatives, namely, the South Africa's Disaster Risk Management Act 52 of 2002 and the South African National Disaster Management Framework (NDMF) 2005, call for "a culture of risk avoidance among stakeholders by capacitating all role players through integrated education, training and public awareness education supported by scientific research" (South Africa 2002; South Africa 2005:83). This gives an indication that the policy framework takes into consideration the critical role played by implementing effective public awareness education campaigns in creating community resilience.

In 2012, a Public Awareness Programme was implemented by both the DRMC and the Environmental Management Department of the City of Cape Town. This targeted 12 high schools, with 12 learners from each school. The theme was, "Making cities resilient". The researcher asked the respondents to rate the usefulness of the project. Ninety-nine (99%) felt that the programme was beneficial as it was new information gained. Some of the comments were: "*fun but also educative*"; "*the workshop was excellent*"; "*have gained skills and knowledge on how to help my community and family when floods and fires strike*". The posed question was intended to find out if the programme was relevant to learners who represented their schools and communities. The majority felt that, due to the programme's benefits, there was a need to expand to all schools across the City of Cape Town.

The learners were asked if they made use of ICT tools during the workshop. They indicated that, they were only exposed to technology made use of ICT tools during the workshop. They indicated that, they were only exposed to technology through research on the specific themes within their communities. As a result, the majority indicated usage of personal cell-phones and internet cafés, while a very small number (20%) indicated that they made use of home internet connection. Learners were also asked

whether they had internet connected computer labs at their schools. More than 52% of the learners indicated that they did not have internet connected computer labs at the time this research was conducted. Based on the researcher's observation and geographical location of the schools, the schools without internet connected computer labs were those described as poorly resourced; and are located within poorer communities. The availability of internet connected computer labs would make eLearning interventions implementable. The pie chart below represents internet connectivity at schools that were represented by participant learners in this research.

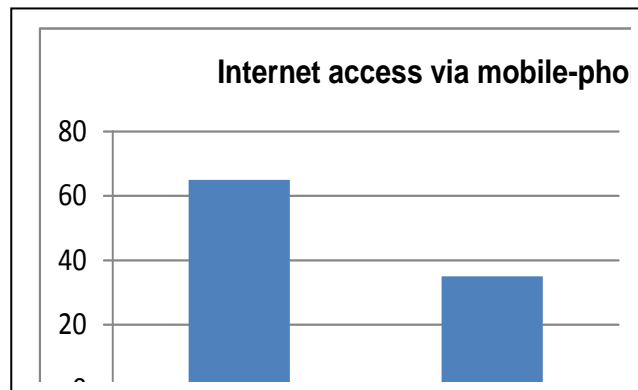


Figure: 2. Internet connectivity Pie Chart

The researcher, through informal interviews and observations found out that, 65% of the respondents had internet access via mobile-phones which is relevant to the implementation of eLearning. **The figure below provides this information.**

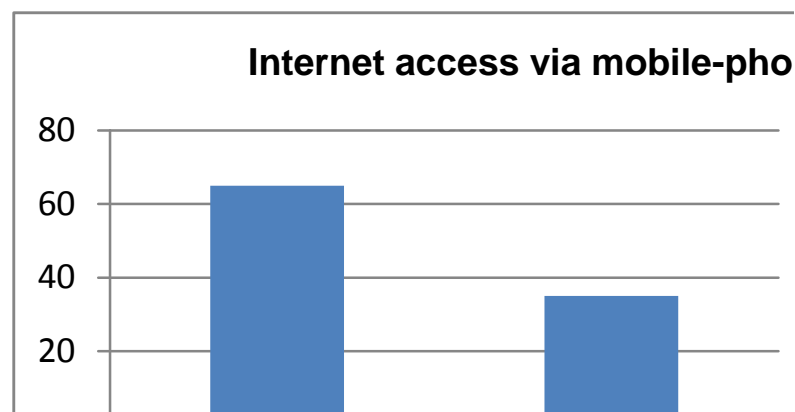


Figure: 3. Internet access via mobile-phones

As indicated earlier, 10 open-ended questionnaires were also distributed to the top management. One of the questions was to enquire if ICT was currently being used at the Disaster Risk Management Centre Department for public communication. The main forms of communication were: strong partnership with radio (FM) stations; and print media. Other forms mentioned include, community newspapers; fixed and cellular phones; short message services (sms); emails, internet (facebook and twitter). Flyers are also distributed to vulnerable communities and the City of Cape Town website is kept updated (YouTube videos).

The researcher also requested that the management comment on the availability of technological resources. The respondents indicated that even though the available equipment and technology was effective, it needed a major upgrade and maintenance. For example, the researcher, during a tour at the DRMC also learned from the employees that there were too few screen monitors available for

surveillance activities. Furthermore, another group of respondents (95%), volunteer coordinators, indicated that there was a need to upgrade the provision of ICT. The majority indicated that they needed to be provided with personal laptops and internet connection. This would enable them to update what is happening on the ground as they are mostly the first ones to report disaster occurrences. Hence, they pointed out the occurrence of many delays, as they were expected to travel to relevant Service Delivery Areas or the Head Office in order to access computers. Following, they indicated the need for more advanced capacity building programmes.

Lastly, respondents were requested to comment on the improvement of the programme. A need was expressed for an increased number of workshops, possibly more than six. A suggestion was also made regarding the need for alerts via mobile phones to target the entire community. As most community members owned cell phones, sms bulk information could be sent from the DRMC. Some schools in CoCT who do have access to internet can be encouraged to distribute alerts to the school community, and communities around them via learners.

5 Recommendations

It is generally accepted that there is need to find ways in which disaster- related death and destruction of property can be prevented or minimised. One would ask; what went wrong on New Year's morning when 5 people died and 4,000 people were left homeless when a devastating fire broke out in BM Section of Khayelitsha, Cape Town? There is need for the City of Cape Town to devise ways to reach many people through its Public Awareness Education Programme. A more serious partnership should be established with service providers, namely, Vodafone, MTN, Telecom and others in order to develop a comprehensive data base with cell phone numbers and physical addresses for its residents. When this is available, bulky early warning messages can be sent to residents so as to warn them before a disaster occurs. This may also include a voice recorded link. Many Capetonians own smart phones and the city could utilise social networking services like mixit, whatsapp (free instant messaging applications), face book and twitter to alert residents. There can be an arrangement whereby a message is send directly to those who have such accounts. All languages commonly spoken in Cape Town also need to be considered when communicating messages.

The Centre of Innovative Educational and Communication Technologies (CIECT) at the University of the Western Cape should work in collaboration with municipalities, and other policy-makers, to come up with an eLearning Course on disaster risk resilience, to directly train practitioners and the public on disaster management. This can be integrated within the eCentre manager training project that has been on-going since 2010. Furthermore, DRMC has reliable internet connection which would make implementation of eLearning course easy for its employees. "One of the chief benefits of developing the e-learning courses is the potential for ease of reuse and adaptation of e-learning content" (IFRC, 2011:46).

6 Conclusion

This paper demonstrated how eLearning as an ICT tool is relevant for the implementation of Public Awareness Education in the CoCTDRMC. Consequently need for its implementation is imperative to foster targeting of many residents which eventually will save lives and property.

Acknowledgements

Authors are grateful to the employees of the City of Cape Town Disaster Risk Management Centre for allowing this research to be conducted. Our sincere gratitude, to all the learners who responded to the questionnaires.

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