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Disaster Resiliency and Culture of Preparedness for University and College Campuses

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Abstract

Most universities and college campuses across the United States are engaged in developing policies, programs, and systems to reduce risks and maintain safety and security on their campuses. This article identifies key factors such as all-hazards comprehensive emergency plans, continuity of operations plans, emergency information management, leadership support, community partnerships, and training and certification programs that are important for creating disaster-resilient institutions and assessing how different colleges and universities across the country have developed and incorporated these key essentials to prepare for effective disaster response. Results show that developing an all-hazards plan, conducting regular training and exercises, and developing strong community partnerships are the most important elements for creating a disaster-resilient university, well prepared to tackle any calamity or tragedy.

Keywords

disaster resiliency, culture of preparedness, emergency information management, campus emergency management, continuity of operations planning

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Introduction

In the United States, more than 4,000 public and private institutions of higher education (IHEs) are involved in developing policies, procedures, and strategies to maintain a safe campus life and environment (U.S. Department of Education [DOE], 2009). Campus safety and security issues have gained momentum overtime since the nature of campus crimes and campus threats have evolved. Certain incidents and events have been very powerful in shaping the current laws and policies related to campus safety. Such events, as Rubin (2007) states, are focusing events as they have a significant impact in terms of affecting geographical areas and lives, and are unique with a high level of visibility.

Focusing events have contributed to legislative and policy changes pertaining to specific disaster threats. The Federal Crime Awareness and Campus Security Act of 1990, later amended in 1998 and referred to as the Clery Act, was a direct result of the brutal rape and murder of Jeanne Clery, a freshman at the Lehigh University in 1986. The key purpose of this legislation across IHEs was to create awareness about crime-related issues in universities and colleges. This act pressured universities and colleges to take safety and security measures on their campuses (Fisher, 2002). The massacre at Virginia Tech in 2007, which left 32 people dead, was a major focusing event that shook educational institutions throughout the country. Lack of coordination as well as the exchange of misinformation, among those individuals and departments aware of the student's mental health condition, were major factors that led to this incident (Stewart, 2009). Many proposals for reform and legislation concerning close coordination between mental health providers and university administrators were proposed after this tragedy (Flynn & Heitzmann, 2008). At the federal level, Congress made additional revisions to the Clery Act in 2008 by incorporating the requirement of developing and implementing emergency response plans across campuses. Immediate notification to students, faculty, and staff about an emergency is also part of this amendment, provided that this does not create conditions that aggravate the emergency (Drysdale, Modzeleski, & Simons, 2010).

Many events outside of campus boundaries have also had a deep impact on campus communities in the recent past. Hurricane Katrina in 2005 affected 31 colleges and universities out of which many played a significant role in providing response and rescue resources for disaster victims. As a result of this event, the Department of Homeland Security (DHS), under the Presidential Directive-5, now requires universities to create and develop emergency plans that are compliant with the National Incident Management System (NIMS; Edwards & Goodrich, 2009).

These recent incidents reflect the diverse nature of threats and risks permeating universities and colleges across the country. Due to the difficult nature of preparing for all risks and threats, campuses often realize that they are preparing for the more recent events in history, which possibly leads to responding to a situation they have not prepared for (Zdziarski, Dunkel, Rollo, & Associates, 2007). College campuses need to change their short-term focus toward a sustainable and resilient approach. Resiliency is a concept that has gained importance in the field of disaster management. It is a concept that emphasizes building adaptive capacities through social capital development, community competence, and strong communications and information systems (National Research Council [NRC], 2009). In this article, we apply the concept of resiliency to IHEs. Through this research, key elements of a disaster-resilient university (DRU) are introduced that provide a model, as well as visionary direction, for universities to adopt to create the capacity and readiness to tackle disasters and emergencies. To guard the campus community against threats, a DRU has to be created to ensure an overall culture of preparedness is developed and a campus is properly prepared for all dangers that are unique to it.

Developing a DRU not only helps to prepare for disasters but also helps in achieving the goals of long-term sustainability of a university. Universities play many roles in a community, and apart from academic services, they provide many research and partnership opportunities for the community in which they reside. In the wake of a disaster, the ability of an institution to continue its operations is not only important to the faculty, staff, and students but also to the community at large (Federal Emergency Management Agency [FEMA], 2003). This research examines the following research questions:

Research Question 1: Why is it important for a university to become disaster resilient and prepared?

Research Question 2: What key elements are important to create a DRU?

Research Question 3: What resources do campus emergency managers (EMs) share with community partners and agencies, and which collaborative emergency management activities do they carry out with them?

First, we will define the concepts of resilience generally and in the context of educational institutions. A thorough literature review and content analysis of reports on campus preparedness and emergency management are reviewed to highlight key elements that may lead to the creation of disaster resiliency

and preparedness on campuses throughout the country. The "Method" section delineates the sampling method and type of survey instrument used to test hypothesis, which are set through the literature review. In the findings section, we discuss the survey and regression analysis results to conclude which factors and elements correlate with perceived levels of resiliency, and preparedness within university and college campuses.

Literature Review and Background

It is important to understand that variations in structure, geographical location, history, and culture make every institution unique (National Clearinghouse for Educational Facilities, 2008b). To create resilient systems, institutions need to assess their unique vulnerabilities and plan mitigation strategies accordingly. The creation of disaster-resilient systems is important as they are essential for a university to continue to carry out its mission following a major disaster or catastrophe. However, much work goes into ensuring that a university is prepared and resilient.

Before we highlight common practices and actions implemented and adopted by colleges and universities to become more prepared and resilient, it is important to explain the concept of resiliency in detail and discuss the concept of developing a culture of preparedness, which is central to the concept of resiliency in the context of campus settings.

Disaster Resiliency

Resiliency, in the context of disasters, is an evolving concept. It is more comprehensive compared with the concept of disaster resistance. Resistance focuses on predisaster plans and mitigation strategies that improve infrastructure and institutions by making systems resistant to disastrous effects, while resilience also focuses on capacity building for physical structures and systems and the social community that helps to respond and recover from disasters effectively (Godschalk, 2003; Kapucu, 2008; Kapucu & Ozerdem, 2011; Longstaff, Armstrong, Perrin, Parker, & Hidek, 2010; Tierney & Bruneau, 2007).

The NRC (2009) defines resiliency as "[t]he response to stress at individual, institutional, and societal levels categorized as the characteristics that promote successful adaptation to adversity" (p. 2). According to Kunreuther and Useem (2010), resilience entails the ability and capacity to "cushion potential losses through inherent or explicit behaviors in the aftermath of a disaster and through a learning process in anticipation of a future one" (p. 11). Similarly,

Britton and Lindsay (2005) define resilience as the "ability of systems to absorb change and to either bounce back, or to shift to new points of stability" (p. 52). The definition of resilience includes elements such as redundant systems, resourceful capabilities, sophisticated and efficient communication systems, and the ability to self-organize in the face of disasters. Although the concept of resilience is difficult to predict and quantify (Longstaff et al., 2010), Bruneau et al. (2003) aim to quantify it through three measures, which are reduced failure probabilities, reduced consequences from failures, and reduced time to recovery.

Kendra and Wachtendorf (2003) believe that "resilience appears to be as much a set of attitudes about desirable actions by organizational representatives as it is about developing new capabilities" (p. 11). Resiliency is not only a multifarious concept but also an ideal, as no community or organization can be fully resilient and secure from disasters and their impacts (Twigg, 2007). Similar to the concept of resiliency is the concept of creating a culture of preparedness.

Culture of Preparedness

Disasters have taught us that "even the best laid plans are utterly worthless if citizens are not prepared to receive, understand and execute them" (Light, n.d.). Although campuses across the United States are laying emphasis on creating comprehensive emergency management plans (CEMPs), cultivating a deeper sense of executing and understanding these plans among the campus communities may be missing at large. However, some initiatives by the federal government aim to prepare educational institutions against disaster threats. Some federal-level initiatives are summarized below.

- *Safe School Initiatives by DOE and DHS*: These focus on disaster prevention initiatives such as understanding the mind-set of students who are likely to commit crimes on campus and creating threat assessment teams that can help to manage such students. The Office of Infrastructure Protection at DHS develops and issues reports on vulnerabilities within educational institutions and then submits these reports to the respective local law enforcement offices and school officials to help identify vulnerabilities that may preclude threats. DHS has also conducted 40 on-site visits to schools to help officials identify possible hazards and threats (DHS, 2007).
- *FEMA's DRUs Initiative*: Federal government provides financial assistance and grants to state and local governments that are actively

involved in community preparedness efforts (DHS, 2007) and direct grants to educational institutions that are moving toward disaster resistance (FEMA, 2003). This initiative aimed at providing universities a model to conduct their vulnerability and risk analysis and manage their local threats by adopting mitigation actions (Comerio, 2000).

- *FEMA Training Courses*: These courses are offered online via the Emergency Management Training Institute that universities and schools can access. A range of courses that directly relate to school safety, such as school safety for floods, earthquakes, and high winds, are offered through this institute (DHS, 2007).
- *Emergency Management Accreditation Program (EMAP)*: This is a pilot assessment for IHEs currently conducted through the EMAP. The EMAP is a voluntary assessment that also involves an accreditation process based on the American National Standards (EMAP, 2011).

Steve Charvat is the emergency management director at the University of Washington in Seattle. He is a leader in university emergency management and has many years of experience in the emergency management field. He previously served as the director of the Training, Exercise, Mitigation, and Plans Division for the Emergency Management Agency in Washington, DC. According to Mr. Charvat (personal communication, March 26, 2011), the FEMA DRUs program was a temporary funding program that helped in developing some key systems and plans for preparedness and mitigation of threats but lacked ongoing funding support and sustainability concerns. This program was often confused with an accreditation program. Mr. Charvat currently chairs the working group that is tasked for testing 56 EMAP standards in IHEs. As mentioned earlier, the EMAP program is currently a pilot project funded by FEMA that was initiated in January 2011 and will last for a year and a half.

Along with top-down programs, initiatives within local communities and universities are important to nurture a culture of preparedness. A study carried out by Citizen Corps on community resilience discovered that citizens are actually less prepared for emergencies than they perceive and may be held responsible for their lack of preparedness as they fail to take the minimum, necessary actions. These necessary actions involve having a weather radio or an emergency kit in their house (Citizen Corps, 2007; Kapucu, 2008). Complacent behavior of citizens during emergency response also reflects their lack of preparedness. Wang and Kapucu (2008) suggest that complacency is a fundamental problem that needs to be addressed to enhance preparedness. They suggest that government plays an important role in constructing useful

communication strategies that decrease public complacency and increase resilience and preparedness. Complacency is also an important issue in the context of campus settings. FEMA (2003) emphasizes that as students may not be directly involved in risk-reduction procedures, they are vulnerable to disasters risks and complacency.

Several researchers emphasize partnering with students and incorporating them along with faculty members into crisis-reduction efforts on campus to avoid complacent behaviors during emergencies. Training opportunities need to be available to students and faculty alike, which allow them to know what to do during a crisis. The use of marketing procedures, protocols, and plans posted on websites and throughout the campus will help create awareness about preparedness efforts (U.S. DOE, 2007). In a study conducted by the International Association of Campus Law Enforcement Administrators (2006), suggestions for campuses to prepare well for disasters were recommended. One of the suggestions emphasized the importance of identifying areas for shelter on campus and creating awareness about them. The University of New Orleans has been actively involved in conducting multicultural community outreach campaigns for educating the campus community and creating awareness about mitigation strategies by developing tailored programs for special needs populations, international students, and other vulnerable populations (Kiefer, Farris, & Durel, 2006).

Crisis experts also advise educational institutions to invest in improving the culture and climate of school preparedness through policy and curricula. Universities should nurture a culture of connectedness, which means faculty and students respect each other, encourage openness, and share a healthy relationship. This would help mitigate violent crimes on campus (U.S. DOE, 2009). Thus, along with building a culture of preparedness through awareness campaigns, training exercises, and information dissemination about emergency plans through websites and posters, a healthy campus culture of openness between staff, faculty, and students needs to be encouraged and developed.

Mitroff, Diamond, and Alpaslan (2006) carried out a survey of colleges and universities to gauge the state of crisis preparedness activities. According to Mitroff et al. (2006), a well-prepared campus has a great disaster management program with four main features: (a) It caters to and prepares for various types of disasters and crises, (b) it has methods and systems that collect cues signaling early warnings of potential crises, (c) it has a multidepartment and interdisciplinary disaster management team, and (d) it encourages and ensures buy-in and support from a number of internal and external stakeholders. Early signs of weaknesses within the current crisis-management system or in current plans should result in improving current systems as these systems are developed with

a certain adaptive capacity. The authors emphasize that a culture of preparedness will be cultivated throughout the campus when a multidepartmental and multidivisional disaster management team is formed that is supported by the campus leadership. In addition, this team should be the result of numerous meetings and simulations to ensure that the capacity of managing emergencies is being addressed rather than simply forming a list of people from different departments and bunching them together to form a team. Disaster management, as Mitroff et al. (2006) put it, needs to be an integral element in "the strategic governance of colleges and universities" (p. 67).

Thus, the concepts of resiliency and culture of preparedness are at the heart of creating DRUs and colleges. A review of literature was conducted to delineate the key elements and activities, which universities and colleges are adopting or should adopt to guard against disasters and emergencies.

All-Hazards CEMP

Most universities and colleges are involved in preparing and adopting disaster management plans. The comprehensiveness and the regular improvement of these plans are vital for preparing universities against potential threats. A holistic approach has to be applied when developing a comprehensive plan so that individual safety plans for various university departments and divisions are integrated; and redundancies and inefficiencies in existing plans are addressed (Kiefer et al., 2006).

A CEMP is compliant with the four phases of emergency management (mitigation-prevention, preparation, response, and recovery), identifies and includes risk assessments and plans, and prepares for emergency situations and vulnerabilities that are unique to an institution. It also identifies the roles of faculty, staff, and students in different phases of an emergency management cycle, is aligned with government emergency plans, and ensures compliance with the NIMS and Incident Command System (ICS; U.S. DOE, 2009).

Having an effective all-hazards CEMP has many benefits. An all-hazards approach helps to cater to a range of man-made and natural threats and also ensures adaptability and flexibility in the emergency management plan document. Comprehensiveness not only entails including all phases of emergency management but also entails addressing the needs of vulnerable populations such as special needs populations that might have certain disabilities or experience language barriers (U.S. DOE, 2009). Comprehensiveness also allows college officials to strategize when and how a crisis-management plan is activated, who will be part of the crisis-management team, and what specific protocols and procedures for response and recovery will be applied to a crisis (Zdziarski et al., 2007).

Due to the unique circumstances of campuses, there is not a "one plan fits all" template applicable to all educational institutions. Campuses have to develop an individualized plan based on the specific threats and vulnerabilities that they face, and this requires collaborating with internal and external community players. Not only is collaboration important in the planning phase, it is also essential in the implementation phase of the CEMP when endorsement is required from leadership within the campus and also from the community stakeholders (U.S. DOE, 2009).

Although there is no template to mitigate unique threats and risks completely through a plan, Zdziarski et al.(2007) provide guidance in his description of the anatomy of a CEMP, which is composed of the following nine components:

- A plan activation component which deciphers when a plan needs to be activated
- Clear lines of authority that depict a hierarchy of roles that lead to the campus president
- Action steps that give campus officials the roadmap of what to do depending on the nature of a crisis, and identification of key responsibility modes that help campus emergency staff to take appropriate actions depending on the level of disaster
- Established communication methods including a communications center that will ensure effective information exchange
- Redundancy of critical staff to make sure staff is available in disasters; clarified media responsibilities to avoid misinformation that would endanger lives and delay proper response
- A clarified role for campus security and outside agencies and a plan for business resumption such as a detailed Continuity of Operations Plan (COOP) that will help to restore operations.

Mitigation actions are vital for achieving resilience and require a very thorough risk assessment which forms a very important component of any CEMP. A risk assessment allows university officials to conduct a campus-wide hazard identification assessment, the vulnerability of critical facilities and functions on campus by involving all campus units in the exercise (The University of North Carolina State, n.d.). It allows campuses to establish early response priorities by identifying potential hazards. The FEMA Handbook to *Building a Disaster-Resistant University* identifies four stages for risk assessment: (a) identifying natural and man-made disasters that are a risk to the college or university, (b) profiling hazard events, (c) creating an inventory of assets, and (d) estimating losses (FEMA, 2003).

The first step of risk assessment is identifying hazards that are unique to the campus by partnering with local emergency management offices and studying the history of the college or university through the use of newspaper articles related to historical events, viewing the CEMPs of the surrounding community, and identifying what events it has been most susceptible to (FEMA, 2001). Once hazards are identified, a list is created according to the hierarchy and likelihood of an event (FEMA, 2003).

The second stage in risk assessment is profiling the hazards and involves collecting details of each hazard and the possible impacts it might have on a campus. This stage identifies different characteristics of an event that help to determine what steps should be taken to properly prepare and respond to them (FEMA, 2001). Once hazards are profiled, a campus map is developed that incorporates all possible institutional features such as buildings and structures, critical infrastructures including roads and communication networks, public safety services such as police and fire departments, location of EOCs, shelters, and important surrounding buildings (FEMA, 2003). Mapping these areas helps to identify the multiple degrees of risk on the campus (FEMA, 2001).

The third stage of risk assessment is inventorying campus assets, which includes an accurate description of buildings in hazard areas, including the name, size, functions conducted (e.g., classroom, administration, finance), and any activities housed within these buildings (e.g., sponsored research).

The fourth step is to estimate losses by describing emergency scenarios and events that affect people on campus and impact buildings and infrastructure (FEMA, 2003). This information is determined by combining the hazard profiles and the inventory of campus assets (FEMA, 2001). Conducting a loss estimate can range from estimating the loss of life and property to estimating the loss of necessary equipment and research facilities (FEMA, 2003). Thus, a comprehensive risk assessment as part of a CEMP and as a risk management tool helps to mitigate threats on campus and takes a leap forward toward preparedness and resiliency.

Britton and Lindsay (2005) suggest that although risk management has been a fairly old tool that carries out risk assessments and analyzes hazards, its application is still evolving. Risk management essentially requires analyzing different options and weighing their costs and benefits to address the identified threats and vulnerabilities within a particular area. They emphasize that this approach should not only be oriented toward short-term solutions but should also be increasingly geared toward long-term sustainability of a community that incorporates social and economic goals established within communities. Holistic management and decision making is required to weigh the

costs and benefits of actions that will help to mitigate future threats while increasing community sustainability. A holistic approach will ensure that a certain decision aimed at reducing a particular hazard threat is not adversely affecting and increasing other threats and vulnerabilities within a community (Britton & Lindsay, 2005).

Hypothesis 1: Creating and implementing an all-hazard CEMP contributes positively to the perceived level of resiliency and preparedness on campus.

Continuity Planning

For creating a DRU, it is important that campus operations such as teaching, research, and other auxiliary services are not disrupted for too long and an overall continuity plan is in place. Continuity planning can help to lessen the impact of a crisis and, more importantly, to allow an institution to continue operating during a crisis (DHS, n.d.). Without a proper continuity plan, a school risks extending classes, suspending semesters, and delaying crucial research. A COOP outlines guidelines and procedures for response and recovery operations that ensure the continued functioning of critical operations on campus. A comprehensive COOP by an institution defines the roles, functions, and priorities for faculty and staff following an emergency as a means to quickly restore a university to a functional status and involves key academic affairs personnel, departmental heads, and other important contacts that have stakes involved in ensuring instructional continuity (FEMA, 2003).

It also reduces risks of failure to critical infrastructures, minimizing the disruption of critical support functions and protecting business resumption capabilities (The University of Utah, n.d.). The George Washington University (2009) has a comprehensive COOP that includes (a) identifying critical operations and functions and the minimum requirements to perform them, (b) identifying internal and external dependencies, (c) determining alternative methods and redundancies, (d) identifying steps for recovery and restoration in addition to goals and timelines, (e) examining assumptions, (f) examining communication methods, (g) tracking incident-related expenses/financial components, and (h) implementing the plan.

Communication is vital when executing a COOP as the institution needs to contact students via email addresses and text messaging to disseminate vital information and preestablish points of contact that students can refer to during and after an emergency (College of Southern Maryland, 2009; Zdziarski et al., 2007). Emergency instructions should also be disseminated

ahead of time allowing students, faculty, and staff to quickly know what to do prior to and during a crisis (Zdziarski et al., 2007). Ideally all important records must be preserved at an off-campus site to maintain any key information needed, and to increase COOP effectiveness, a specific time frame to return to core functional operations has to be established as well (College of Southern Maryland, 2009).

Alternate arrangements for instructional continuity need to be preestablished as students may not be able to continue at the same school until things are back to normal (College of Southern Maryland, 2009). Following Hurricane Katrina, displaced students at local colleges and universities were able to attend classes at different colleges until their home colleges were properly restored (Zdziarski et al., 2007). Thus, the quality of continuation and adaptive capacity reflects resiliency within continuity planning.

Hypothesis 2: Continuity planning is positively related to the perceived level of disaster resiliency and the level of preparedness within universities.

Leadership Support

Leadership support ensures that the campus community is involved and motivated toward establishing resilient systems (U.S. DOE, 2009; FEMA, 2003). During a crisis, leaders are expected to implement the crisis plan, delegate authority to others when appropriate, remain open to suggestions from stakeholders, and respond quickly and efficiently (U.S. DOE, 2009). During Hurricane Katrina and Hurricane Rita, the lack of leadership support resulted in hampering relief efforts as there was no one to lead effective coordination of federal, state, and local operations (Waugh, 2006).

Delegation of responsibilities is integral when it comes to successful emergency management on campus. Senior leadership is not involved in the day-to-day operations of managing an emergency plan and carrying out preparedness activities. The senior leader will develop a crisis team that overlooks disaster-reduction functions and will secure commitment from within and outside the campus by identifying key stakeholders and partnering with them to support opportunities for training and exercises (U.S. DOE, 2009). If there is overcentralization of decision-making authority vested with the president or chancellor, delays will be caused in responding to emergencies. Response to Hurricane Katrina highlights the overcentralization of responsibilities that resulted in long delays in deploying response personnel and crucial resources (Waugh, 2006). It is recommended that the president or

chancellor of a university should choose a responsible team player who shares the president's vision for building resilient systems and uses campus resources effectively to manage this initiative (U.S. DOE, 2009).

Thus, support from leadership is crucial to create and implement disaster-reduction and resiliency efforts. Not only will the senior leader's commitment encourage the campus community to participate in efforts, but his or her strong position within the campus will also result in better allocation of resources for emergency management efforts. Support from senior leadership will also help in endorsing and implementing emergency management plans and protocols and in creating internal and external partners that engage in the emergency management process (U.S. DOE, 2009; Kapucu & Ozerdem, 2011).

Hypothesis 3: Senior leadership support is positively correlated with the perceived level of preparedness and disaster resilience in a university.

Partnering With Key Community Actors

A DRU has to develop strong working relationships with its surrounding community, not only during response and recovery from a disaster but also in its preplanning and preparedness efforts. There are a variety of strong relationships that have to be developed prior to an emergency, especially with public sector organizations and departments, including offices of local emergency management; local first response units such as fire and rescue, public safety, and police departments; and medical and health services. Nonprofits such as Red Cross and Salvation Army are also important partners in the emergency management process and help to provide temporary housing and food to displaced students and employees during emergencies (FEMA, 2003). The private sector can also help provide assistance to colleges and universities during a disaster or crisis. In 2005, during Hurricane Katrina, Verizon Wireless provided technical assistance by donating mobile cell towers, generators, and portable transmission sites to assist with additional coverage in the hardest hit areas (Business Wire, 2005). Moreover, according to the U.S. DOE (2009), the campus public relations office should also work very closely with media agencies within the community so that emergency plans and protocols and warning signals along with endorsement of emergency messages can be carried out effectively.

To establish proper collaboration between outside agencies and the campus, two things are very helpful: precrisis network building and establishing mutual aid agreements. Precrisis network building involves developing relationships

with agencies for information sharing and exchange prior to a crisis and by involving them in campus training exercises and drills. This type of networking helps to familiarize first responders and local agencies to campus structures and culture. Moreover, campus officials are also able to delineate which resources and skills outside agencies bring to the emergency management and planning table (Zdziarski et al., 2007).

Creating strong public–private partnerships are important to reach the goals of building capacity and developing leadership support across sectors to develop and implement risk-reduction strategies (Kunreuther & Useem, 2010). Mutual aid agreements are established when the expertise and services of outside agencies are required to support campus emergency management operations. Typical mutual aid agreements include a formal request, delineate who is in charge of overseeing operations, outline the level and type of services required, include and specify financial obligations, and help to formalize expectations in partnerships (Zdziarski et al., 2007).

Thus, collaborating, networking, and partnering with key community actors such as local emergency management offices, media agencies, nonprofits, and private entities are integral to achieve disaster-resiliency goals within a campus.

Hypothesis 4: Partnerships with key community players contribute positively to the perceived level of resiliency and helps to create a culture of preparedness.

Emergency Information Management and Risk Communication

Emergency information management is "the sending and receiving of messages to prevent or lessen the negative outcomes of crisis and thereby protect the organization, stakeholders, or industry from damage" (Coombs, 1999, p. 4). During a crisis, there are three crucial steps in emergency information management: information gathering, information processing, and processed information dissemination. During the information gathering phase, the main concern is to gather as much accurate information possible about the crisis by collaborating with external partners and community organizations (i.e., the fire department, police department, national weather service, public works, the public; Kapucu, Berman, & Wang, 2008). The next step in emergency information management is information processing in which information is carefully analyzed to ensure accuracy and is translated into messages that can be easily comprehended by the public (Kapucu et al., 2008). This

phase not only acquaints EMs about the particular emergency but also helps them develop clear, comprehendible information which they communicate to the public. The last crucial step is emergency information dissemination and requires multiple communication methods, timely notification, and a single voice for communicating all information (Kapucu et al., 2008). Emergency information will be more credible when an accurate message is disseminated clearly, with frequent warnings.

Effective and timely communication is an important element for the safety of faculty, staff, and students immediately prior to, during, and following a disaster. It can positively affect how the community perceives an institution's ability and capacity for handling a crisis (Zdziarski et al., 2007). The death toll from the Virginia Tech campus shootings may also be attributed to the lack of timely campus communication (Kennedy, 2009).

A communication plan should constantly communicate with the campus community and local agencies about the hazards faced by the university (The University of North Carolina State, n.d.) and should also notify students and families of actions that are being taken (U.S. DOE, 2009). A crisis communication plan should incorporate factors such as multiple technologies used for backup, staff trained to use communication technology, messages kept simple, and funds allocated for ongoing awareness programs (Kollie, 2009).

A crisis communication plan should also plan for incoming messages and ensure that the emergency communication center can be reached at all times during an event. Issues of power outages should be addressed by setting up redundant communication systems that ensure the right message is sent at the right time to the right audience (National Clearinghouse for Educational Facilities, 2008a). The plan should also identify the best way to disseminate information during different stages of disaster management. There are many mechanisms in place to alert the university community in the event of a disaster, such as alert systems, email, text messaging, school websites, and the use of social networking mediums. During a crisis, it is possible for school websites and cellular phone networks to become overloaded. Thus, redundant and different mediums of communication become necessary during an emergency (Cohen, 2008).

Crisis communication is different from risk communication as it is event specific, reactive, and takes place during or after a crisis, whereas effective risk communication is proactive, future-oriented, and mitigates the impacts of a crisis. Risk communication is interactive as it involves stakeholders who identify and assess risks and plan for and support the creation of emergency information management systems (Ulmer, Sellnow, & Seegar, 2007). Thus, along with crisis communication, effective risk communication is integral for mitigation and resiliency.

Hypothesis 5: Creating and implementing a risk communication plan and managing emergency information are positively related to the perceived level of preparedness and resilience in universities.

Training and Certification

An educational institution is recommended to encourage faculty, staff, and students to avail training and education opportunities in emergency management and ensure that key staff and faculty are trained in the ICS and are participating in annual emergency exercises and continuous professional development prospects (The University of North Carolina State, n.d.).

The U.S. DOE (2009) identifies key elements for training faculty, staff and students for managing disasters on a campus. These key elements include the provision of regular training for teachers and staff (at least once a year), visiting evacuation sites with staff and stakeholders to acquaint them with evacuation locations and areas where students, media representatives, and triage will be directed to during a crisis. The provision of necessary documents for families and students, such as a summary of the school's CEMP, and designing and conducting regular exercises and simulations are also identified as key elements.

Several training activities can be carried out on campus to prepare individuals for crises. Tabletop exercises are "discussion-based activities that can be used in crisis-management training to assess the effectiveness of a plan while handling operational and communication challenges" aimed at solving problems collaboratively (Zdziarski et al., 2007, p. 192). During a tabletop exercise, participants are presented with a scenario and are required to chalk out their response and actions to these scenarios. Through tabletop exercises, participants learn how to allocate resources during crises and this helps to gauge whether an educational institution has the ability to carry out their CEMP (Allen, Will, Brennon, & Poirier, 2010; U.S. DOE, 2009).

Simulations can test the readiness of participants to deal with an emergency. However, they are time-consuming and require proper planning involving a number of key players (Zdziarski et al., 2007). A well-prepared simulation will be as realistic as possible with actual response agencies participating in the simulation exercise. A predrill and postdrill survey should be included as it provides insight to the campus emergency management team about ways to improve plans and procedures. During the Great Southern California Shakeout, schools created a preparedness survey as well as a postdrill survey. The school preparedness survey covered the assessment of the physical, planning, and environmental response capacity of the school by

identifying current strengths and weaknesses. However, the postdrill survey helped to determine the level of preparedness for the region for the possible threat of earthquakes (Petal & Green, 2009).

Along with tabletop exercises and simulations, campus personnel are being trained in ICS courses. These courses provide a guideline for campus officials to act proactively in emergencies. At the federal level, FEMA offers Independent Study courses on hazards preparation and response that students, faculty, and staff can avail to get certified by FEMA in emergency management. Virginia Tech and the University of Georgia are using an 8-week training program that trains volunteers of students, faculty, and staff. After successfully completing the training program, those students, faculty, and staff members become a part of a Campus Community Emergency Response Team that helps in carrying out damage and vulnerability assessments and response operations, such as search and rescue during an emergency (Roscorla, 2010).

Overall, a campus crisis training program has to be well planned, regularly implemented and updated, and evaluated to ensure that the campus community has developed readiness and resiliency to cope with a disaster (Zdziarski et al., 2007).

Hypothesis 6: A regularly updated and planned crisis training program is perceived to develop disaster resiliency and a culture or preparedness within a university.

Figure 1 shows a DRU framework that encompasses the key elements that are required to create a resilient university as highlighted through the literature review. The framework shows that emergency management planning, building strong internal and external partnerships, and creating a culture of preparedness on campus are essential to develop a DRU that is supported by strong infrastructures and institutions that have developed the adaptive capacities and capabilities to face disasters and emergencies.

Method

Federal documents such as FEMA's guide to *Building a Disaster-Resistant University*, FEMA's guide to Understanding Risk and Risk Assessment, the U.S. DOE's Action Guide for Emergency Management at Higher Education Institutions, the National Clearinghouse for Educational Facilities, and so on, were reviewed for this article. In addition, scholarly articles and actual campus emergency management plans were studied to establish best practices and delineate key elements required to create DRUs.

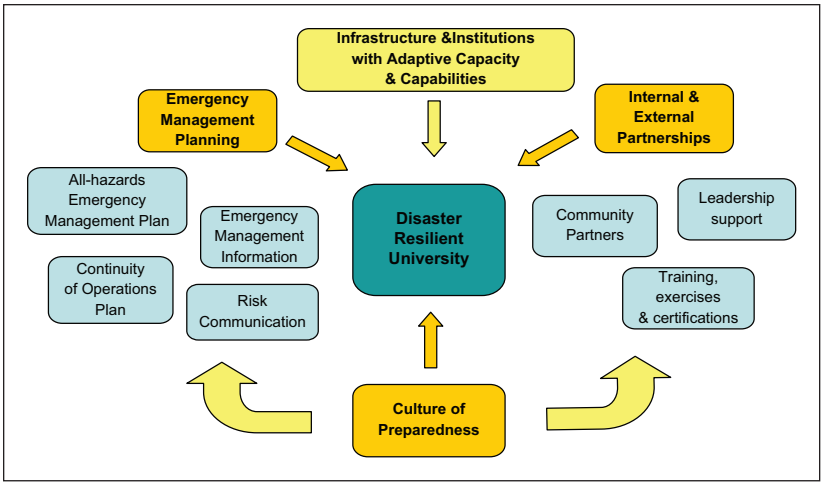

Figure 1. Key elements of a DRU
Note: DRU = disaster-resilient university.

A detailed online survey was developed on the different elements required to create DRUs based on the literature review and some surveys that had been administered earlier. The survey was sent to members on the DRU listserv, which is a network of university/college emergency management professionals. The University of Oregon Emergency Management Program is hosting this listserv, and its purpose is to encourage the sharing of information and experiences of emergency management professionals to address issues and problems related to managing emergencies at university/college campuses. The DRU listserv has more than 450 members and may not represent every university/college in the United States. However, the listserv is a great repository for providing information to institutions that want to become disaster resilient. Currently, the listserv is the only source available that reflects a network of institutions working toward disaster resiliency. It may not be very representative, but it is a rich, volunteer-based source that provides peer-to-peer networking as members can easily exchange information and discuss their unique challenges (S. Charvat, personal communication, March 26, 2011).

The survey was also sent to universities that were recipients of the 2008 Emergency Management for Higher Education (EMHE) grant and/or were part of the FEMA DRU initiative. There might be slight duplication in results since the 2008 EMHE recipients, and the universities/colleges involved in the FEMA DRU initiative may be part of the DRU listserv. However, the number

of duplication is particularly low as only 19 respondents identified that they had received funds from FEMA and 15 indicated that they had received funds from the DOE, which funds the EMHE program.

The perceived level of preparedness and progress of these particular universities were tracked through the survey results to gauge how they had developed their emergency management plans, systems, procedures, and so on, and had incorporated the elements of DRUs as proposed through our literature review and hypotheses. The survey was divided in sections according to the different elements identified. University Disaster Resiliency and Preparedness was designed as a composite scale based on five elements/variables: an all-hazards CEMP, leadership support, community partnerships, emergency information management, and trainings and certification. Each of the five elements had a separate section in the survey, which had items (list of statements and questions) that were answered on a Likert-type scale. Respondents were asked to evaluate these items on a 7-point scale ranging from *strongly agree* to *strongly disagree* (1 = *strongly agree*, 2 = *agree*, 3 = *somewhat agree*, 4 = *don't know*, 5 = *somewhat disagree*, 6 = *disagree*, and 7 = *strongly disagree*).

The items in each section covered element components highlighted through the literature. For example, the element emergency information management has further components such as information gathering, information processing and processed information dissemination components (Kapucu et al., 2008), and each component has few statements that cover the important aspects of that component. There were a couple of open-ended and dichotomous questions on the survey as well. In addition, results pertaining to community partnerships and collaborative emergency management activities were analyzed through an affiliation network using the UCINET software. The affiliation network explored the relationships between different agencies/players and their activities/resources.

The majority of survey respondents were EMs, EM coordinators, directors and assistant directors of the Office of Emergency Management, Risk Management, Environmental Health & Safety (EH&S), Emergency Planning and Business Continuity. Out of the 114 respondents, only 2.7% reported they were somewhat familiar while others indicated high levels of familiarity with emergency management and planning at their university/college. The high level of familiarity exhibits that survey results are important and significant for this research.

Although this research relies on perception-based responses, it is important to emphasize that this information is provided by EMs and appropriate staff who are well acquainted with emergency management programs, systems, and progress of their universities and colleges. Thus, perception-based results are valuable in such a situation.

Table 1. Correlations of the Resiliency and Culture of Preparedness Index With Other Index Variables

	All-hazards CEMP Index	Leadership Support Index	Community Partnerships Index	Emergency Information Management Index	Training and Exercises Index
Pearson correlation	.756	.557	.588	.319	.599
Significance (two-tailed)	.000	.000	.000	.001	.000
N	90	90	90	90	90

Note: CEMP = comprehensive emergency management plan. All correlations are significant at the .01 level (two-tailed).

Findings and Discussions

The results of the correlation analysis are shown in Table 1. The Resiliency and Preparedness Index is positively associated with the index variables of the five elements at the bivariate level showing that improving resiliency and the level of preparedness is positively correlated with the elements identified through the literature. Thus, the increase in resiliency and the level of preparedness in universities and colleges is perceived by respondents to be associated with elements such as developing all-hazards CEMPs, providing leadership support, building strong community partnerships, developing strategies and systems to manage emergency information, and providing avenues for training and exercises in campuses. These relationships are statistically significant at the .01 level and support the hypotheses set forth through the literature.

A multivariate analysis was also carried out to gauge the combined impact of the five elements on the perceived level of resiliency and preparedness in universities and colleges. In this regression model, the dependent variable is the Resiliency and Preparedness Index, whereas the independent variables are indices of All-Hazards CEMPs, Leadership Support, Community Partnerships, Emergency Information Management, and Training and Exercises. Table 2 shows the results of the multivariate analysis.

The multivariate model statistics show a relatively high value of adjusted R^2 (.617) implying that the model explains around 62% of the variation in the Resiliency and Preparedness Index with a .01 statistically significant level. Three out of the five regression coefficients, which are an All-Hazards CEMP Index, Community Partnerships Index, and Training and Exercises Index are statistically significant at the .05 level. Regression coefficients for the Leadership Support Index and the Emergency Information Management Index are not statistically significant. It is fairly difficult to explain the

Table 2. Regression Coefficients of the Multivariate Model

	Unstandardized coefficients		Standardized coefficients		
	B	*SE*	β	*t*	Significance
Constant	−.404	.499		−0.809	.421
All-hazards CEMP Index	.554	.132	.453[a]	4.194	.000
Leadership Support Index	.118	.071	.136	1.651	.102
Community Partners Index	.194	.097	.176[a]	1.999	.049
Emergency Information Management Index	−.165	.211	−.059	−0.781	.437
Training and Exercises Index	.339	.124	.226[a]	2.734	.008

Note: CEMP = comprehensive emergency management plan. Model goodness of fit: R^2 adjusted = .617; Durbin–Watson = 2.149; significant *F* change = .000.
[a]Regression coefficients are significant at the .05 level.

negative sign in the coefficient for the Emergency Information Management Index. These results may be related to the five-level scale that was used for survey items related to Emergency Information Management instead of the seven-level scale that was used for other survey items in the survey. Moreover, the items for the questions in the Emergency Information Management section were extremely detailed and the list of emergency information strategies and methods were very exhaustive. This reason might have led to inconclusive results for this particular index. Moreover, the regression coefficient for the Leadership Support Index is positive but not statistically significant at the .05 level. Perhaps, this finding is a result of only one item being used to gauge the perception of respondents about leadership support.

The overall model is statistically significant as 62% of the variation in the level of perceived resiliency and preparedness in universities and colleges may be explained through this model. Developing all-hazards CEMPs predicts and explains 45% (β = .453) of the variation in the level of resiliency and preparedness in universities and colleges. According to these results, this element seems to be most important for developing a DRU. Moreover, developing and sustaining community partnerships explains around 18% variation in the level of resiliency and preparedness (β = .176); whereas, the Training and Exercises Index explains and predicts around 23% of the variation in the level of resiliency and preparedness in universities and colleges (β = .226). Thus, according to the regression model results, Hypothesis 1, 4, and 6 are supported.

In addition to statistical analysis, the survey results were helpful to understand the perceived progress of universities and colleges across the country in terms of creating disaster-resilient plans and systems and developing a culture of preparedness on campuses via various activities. In all, 50% to 71.6%

respondents indicate that that they strongly agree that the elements identified through the literature review are very important for creating DRUs with respect to their university settings. Respondents also identified additional elements that they think are important to create DRUs. They are as follows: more direction, planning templates, local training, mandates for IHEs (so that universities are NIMS compliant and meet the minimum standards), multimodal communications plan, strong emergency management personnel selection criterion, and buy-in from upper-level management not only in "theory" but also financially.

Resiliency and the Level of Preparedness

Around 31.8% of the respondents are very confident that their university qualifies as a DRU, whereas around 30% report that they somewhat agree that their university qualifies as DRU/college.

Of 97 respondents, 42.7% report that their campus community is well prepared to manage disasters and emergencies, while around 42% indicate that their campus community is somewhat prepared to deal with disasters and emergencies on campus, whereas 15.7% report that their campus community is not well prepared to manage disasters. In all, 75.2% of the respondents report that they make emergency communication procedures available to the campus community and exercise them regularly. In addition, 78.4% report that they conduct a number of trainings and exercises on campus to create awareness about emergency management plans and procedures. Around 78.4% report that the culture in their campus focuses on information sharing between different departments. However, 74.3% of the respondents also report that they focus on information sharing with outside organizations. Overall results show that a majority of emergency personnel perceive that their campuses are fairly well prepared to deal with emergencies and disasters.

Emergency Management Plans

Results from the survey show that 85% of the universities and colleges report to have developed an all-hazard CEMP. In all, 79.6% claim that their comprehensive plan is compliant with NIMS requirements. However, only 35% have a hazard mitigation plan that is approved by FEMA.

Many resources and equipment are required to implement and maintain a comprehensive emergency management system on campus. In all, 54.2% of the respondents report that they have adequate resources to implement and maintain a comprehensive emergency management system. Moreover, routine assessments and inspections around campus are an integral part of maintaining

an updated CEMP on campus. Of the respondents, 83% indicate that their university/college conducts routine assessments and inspections of campus building maintenance (i.e., campus lighting, broken locks/doors, etc.). In addition, 66.7% report that they conduct routine assessments of staff capabilities and resources such as fire, police, and medical resources, and 72% of the respondents indicate that they conduct routine assessments/inspections of vegetation deficiencies that could pose security risks (i.e., overgrown vegetation, etc.). A total of 62.4% of the respondents also indicate that they regularly conduct comprehensive vulnerability assessments, profile hazards, and identify gaps in campus resources and 56% of respondents indicate that their emergency management plans are reviewed annually. Thus, overall, most of the respondents indicate that their universities and colleges are conducting routine assessments and inspections, profiling hazards and identifying gaps in resources to improve their emergency management plans.

Continuity Planning

Out of 75 respondents who responded to the question pertaining to continuity planning, 52% report that their university/college has a COOP in place. However, out of the 52% who claim to have a COOP, only 59% report that the plan is updated, evaluated, and tested on a yearly basis. Respondents were also asked about the extent to which various elements and functions were addressed and incorporated in their COOPs. Moreover, 73.2% indicate that their COOP incorporates and addresses payroll. Of the respondents, 60% to 70% indicate that class schedules, transportation, food services, timeline for restoring functionality, internal and external dependencies, an off-campus site to preserve records and key information, and alternate arrangements/sites for instructional continuity are all relatively well covered and addressed in their COOPs. Stipends seem to be the only element that is not well covered in COOPs.

Leadership Support

Although results from the regression analysis show that the relationship between the perceived level of resiliency and preparedness and leadership support is not statistically significant, leadership support on campus is as important aspect for creating a DRU. An active formal campus emergency management committee comprising various internal leaders on campus and external players from the community helps to promote and improve emergency management efforts on campus. Of the respondents, 74.2% indicate

that they have a formal campus emergency management/campus safety advisory committee. Almost all respondents (95.8%) indicate that senior administrators sit on their advisory council/committee, 88.7% report that campus security personnel and 70.4% indicate that residence life personnel are part of their respective committees. In addition, 63.4% indicate faculty being involved in the committee, whereas only 18.3% report that students are part of their campus safety advisory council.

In all, 87.1% of the respondents indicate that their university leadership (president/provost/chancellor) actively supports emergency management at their university/college (35.5% *strongly agree*, 33.3% *agree*, and 18.3% *somewhat agree*), whereas 9.8% indicate that university leadership does not actively support emergency management. Moreover, 85.8% also indicate that their institution has established an incident commander to manage and resolve incidents on campus (39.6% *strongly agree*, 29.7% *agree*, while 16.5% *somewhat agree*).

Community Partnerships

Respondents were asked to indicate which community partners they collaborated with while preparing for emergencies. Police, fire, and first responders were the most popular entities as 96.3% of respondents indicate that they collaborate with them. Offices of local emergency management are also very popular community partners, as about 94% respondents indicate partnering with them. In addition, 78% of the respondents report that they collaborate with nonprofit, relief organizations such as Red Cross and Salvation Army. Medical and health service provides are also popular partners for universities/colleges as around 84% respondents report collaborating with medical and health service providers.

Government relief and welfare organizations are not as popular as nonprofit relief organizations, as 54.8% indicate that they partner with government relief and welfare organizations. Moreover, local/community religious organizations are the least popular community partners followed closely by business organizations.

To better understand the type of community partnerships in place, an affiliation network was generated to exhibit how EMs across campuses were partnering with community players for different reasons and resources (Figure 2).

The affiliation network above clearly shows that information is shared more with all external entities and groups when compared with sharing facilities, personnel, and finances. The network also clearly depicts that finances seem to be the least popular element that is shared with these groups. Only

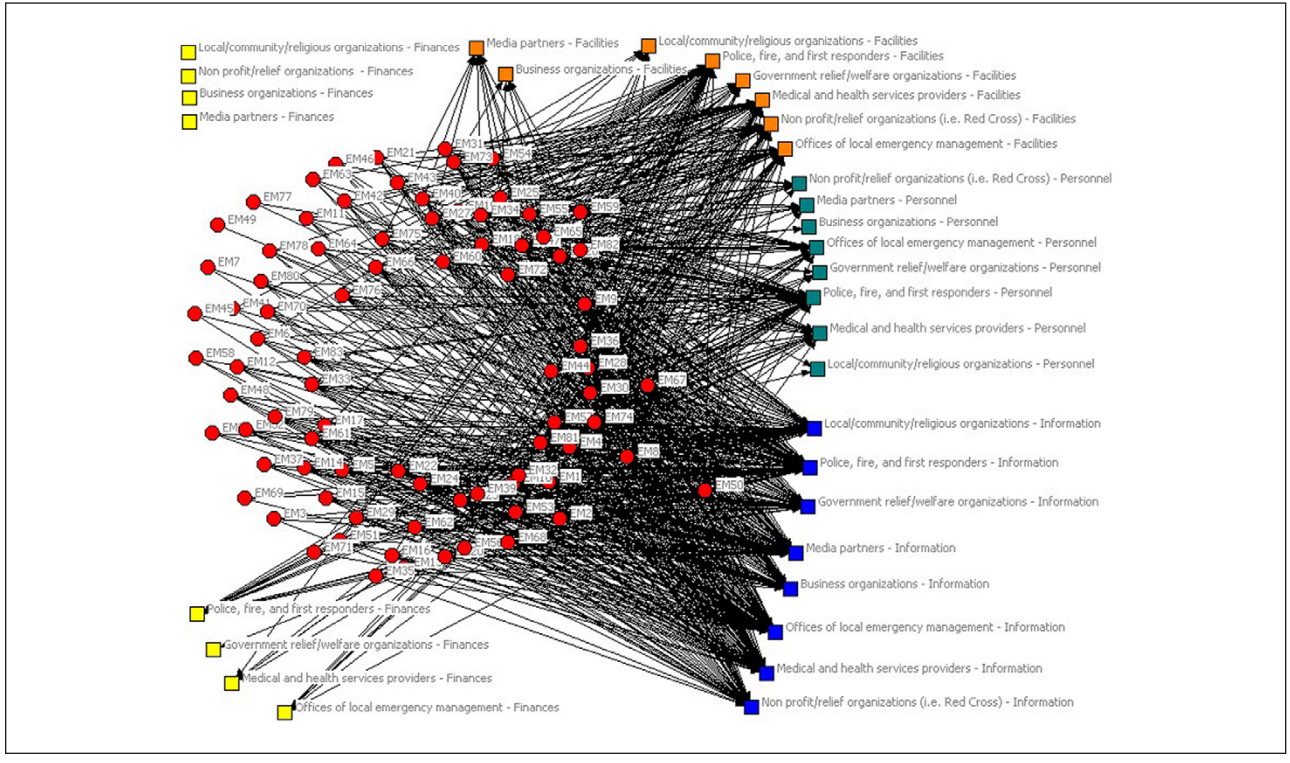

Figure 2. Community partners and resources shared
Note: EM = emergency manager.

few respondents indicate that they share finances with police, fire, and first responders (15.9%), offices of local emergency management (9%), government relief organizations (2%), and medical and health services providers (7.1%). The network analysis shows that EMs do not partner with media agencies, business organizations, nonprofit/relief organizations, and local/community/religious organizations to share finances. After information sharing, sharing facilities and personnel is common across these entities.

Another affiliation network was developed to see which collaborative emergency management activities are being carried out with external community partners across universities and colleges. Figure 3 shows that training and drills are the most popular activity that universities carry out with groups such as police, fire, and first responders (85.9%); offices of local emergency management (69.4%); and medical and health service providers (67.2%). Regular meetings with these groups and review of the EM plan are also popular among these three groups. However, establishing and developing memorandums of understanding (MOUs) and memorandums of agreement (MOAs) is the least popular activity that is being carried out with any group except police, fire, and first responders and offices of local emergency management. The network also shows that all four activities are carried out less with nonprofit/relief organizations, government relief organizations, business organizations, and local community religious organizations and media partners.

Emergency Information Management and Risk Communication

The simple correlation analysis shows that Information Management and Risk Communication share a positive relationship but not a very strong one (correlation coefficient = .319). However, results from the multiple regression model fail to show statistically significant results for this particular element. Despite these shortcomings, exploratory results from the survey show that the most important information source used for gathering information about threats before and after emergencies is the National Weather Service. Other sources referred to as very important are direct observations of university emergency management staff about emergency conditions (65.8%) and communications with local (city, county) EMs (68%). The least popular source is the National Hurricane Center (NHC; as 42.7% indicate the unimportance of this source).

Results also show that various strategies are utilized by universities and colleges to inform the campus community about potential threats. In all, 88.2% of the respondents report that using simple language to explain what

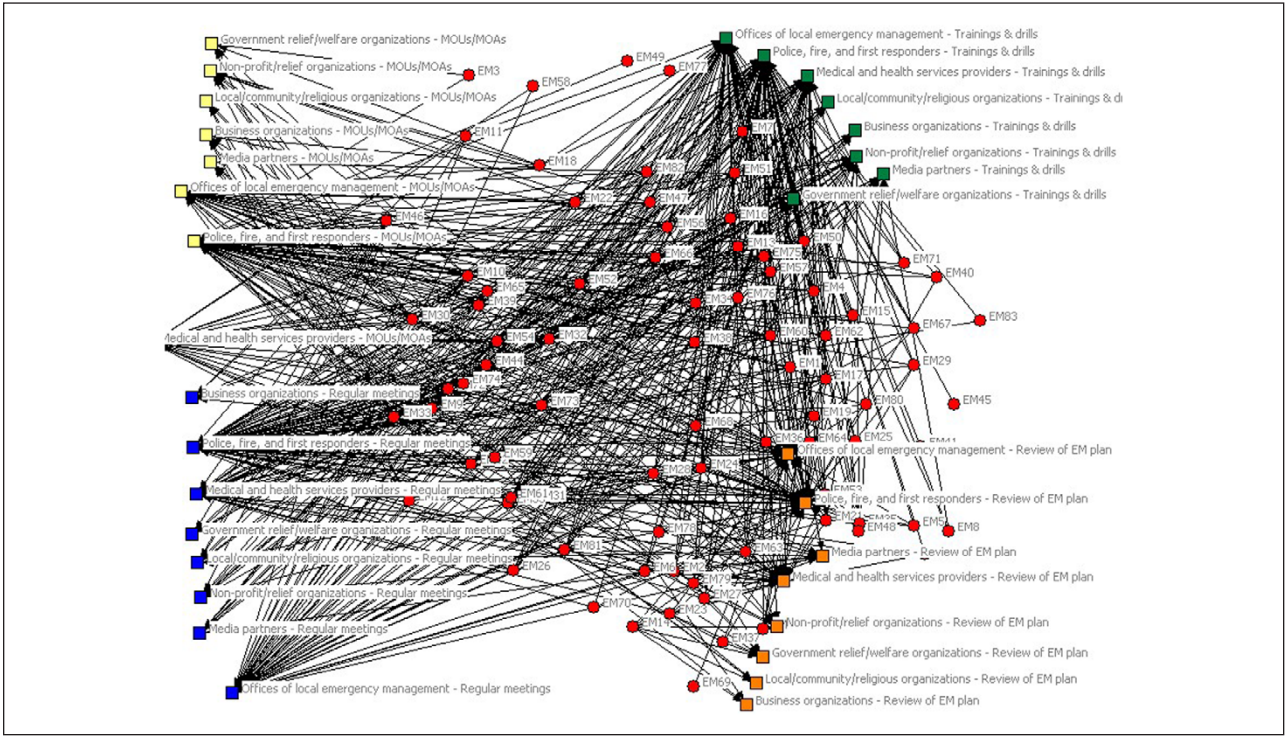

Figure 3. Activities with community partners
Note: MOUs = memorandums of understanding; MOAs = memorandums of agreement; EM = emergency manager.

is going on is the most effective strategy. In addition, 77.6% report that the strategy of including specific action to be taken by students, staff, and faculty in the warning message is an effective strategy. However, tailored warning messages for different cultures on campus and communicating in different languages to cater to the international student body are not very popular strategies. Other strategies listed by respondents were utilizing social networking media, gaining information and partnering with the local health department/government health authority, utilizing reports from local police and fire departments, information sharing with state and county offices of emergency management, and using local fusion centers such as Intel, and so on.

The most important strategies that may be utilized to disseminate information about potential threats on campus highlighted were email, text messaging, university and college websites, responding to rumors/gossip with factual information (51.3% *very important* and 36.8% *important*), using triggers or protocols as the impetus to activate Emergency Notification System (ENS; 53.9% *very important* and 32.9% *important*), and using specific triggers that address the nature of the incident (52.6% *very important*, 32.9% *important*). Using NOAA Radios, outdoor public address, and outdoor warning sirens are the least popular methods for disseminating information on campus.

In addition, 86.8% report that their university/college has a written crisis and risk communication plan, and around 58% report that their university's interdepartmental operability communications equipment is sufficient for their campus needs, whereas 54% report that their institution's intradepartmental operability communications equipment is sufficient for their campus needs.

Training and Exercises

Results show that training and exercises are positively correlated with disaster resiliency and preparedness, and around 22.6% of the variation in the perceived level of resiliency and preparedness is reflected by the Training and Exercises Index. Survey results indicate that around 69% respondents indicate that their institution has adequate resources to implement and maintain comprehensive training programs, and 73.2% indicate that their key staff and faculty are trained in ICS and NIMS courses. Tabletop exercises and ICS and NIMS training are reported to be the most popular types of exercises in university/college campuses, whereas full-scale exercises and evacuation site visits are the least popular type of exercises/drills. In all, 37% respondents report that functional drills and simulations are conducted on a yearly basis, 24.7% indicate that they are carried out once in 2 years, whereas 20.5% claim that they have never been carried out. Moreover, 43.6% of the respondents

Table 3. Comparison Between Universities and Colleges With Grants and Without Grants

	With grants	Without grants
Our campus is well prepared	Agree	Somewhat agree
We focus on information sharing with outside organizations	Agree	Somewhat agree
We have developed and implemented a comprehensive emergency management plan	Strongly agree	Agree
Our institution's intradepartmental operability communication equipment is sufficient for the campus	61%[a]	41%[a]
We have a FEMA approved hazard mitigation plan	50%[a]	31%[a]
We have developed a continuity of operations plan	61%[a]	41%[a]
Our institution has adequate resources to implement and maintain comprehensive training programs	73%[a]	65%[a]
Students, faculty, and staff avail FEMA independent study certification courses on their campus	58%[a]	26%[a]
Key staff and faculty are trained in ICS and NIMS courses	82%[a]	29%[a]

Note: FEMA = Federal Emergency Management Agency; ICS = Incident Command System; NIMS = National Incident Management System.
[a]Includes *strongly agree, agree*, and *somewhat agree* responses.

also indicate that students, faculty, and staff avail FEMA Independent Study certification courses in their universities and colleges.

Grants and Their Impact on the Key Elements

Results were also analyzed to gauge how grants and funds from the DHS, Department of Justice (DOJ), FEMA, and DOE affect key elements identified through literature. In all, 70% of universities and colleges that received grants perceive that their institution qualifies to be disaster resilient, whereas 56% of those that had not received grants also perceive that they qualify as a resilient institution.

Out of 65 respondents, 15 report that they have received funds from DOE, 19 report receiving funds from FEMA, 15 from DHS, and 4 from DOJ. In addition, 70% of respondents who indicate that their universities and colleges received grants perceive that their institutions have achieved the resilient status. Table 3 shows that most respondents who have received grants perceive that their institutions are well prepared, compared with colleges and universities that did not receive any grants. Other differences in results between institutions receiving funds and grants and institutions not receiving funds are

shown in Table 3. Although some differences and variation in results is evident, this analysis is limited. A more thorough regression analysis would be able to demonstrate the significance of variations between universities and colleges that received funds and that did not. A future study could look at these aspects in more detail.

Conclusion

Much work goes into ensuring that a university is disaster resilient such as planning and developing an all-hazards comprehensive EM plan, assessing risks that are unique to a campus or university, partnering with key community actors, adopting and implementing plans, developing a COOP, creating efficient disaster communication systems, and training key personnel on campus, including students, staff, and faculty.

This article has identified key factors that are important to create disaster resilient and prepared institutions, and has assessed how different colleges and universities across the country perceive to have developed and incorporated key essentials that prepare them to face, manage, and respond to disasters effectively. The results from the survey show that 13% of the respondents are confident that their campuses are disaster resilient and almost 43% indicate that they are well prepared to manage disasters and emergencies (7.3% *strongly agree* while 35.4% *agree*). Overall results from the survey show that a majority of campuses are perceived to be fairly well prepared and have the essential elements to deal with emergencies and disasters.

Regression results show that the Resiliency and Preparedness Index is positively associated with the index variables of the five elements at the bivariate level showing that improving resiliency and the level of preparedness may be attributed to these elements. However, results from the multivariate model reflect that training and exercises, developing strong community partnerships, and developing an all-hazards plan are the most important elements for creating a disaster resilient and prepared university.

Moreover, grant programs by FEMA, DOE, and so on, have had a positive impact in improving the level of preparedness and resiliency in universities and colleges. Most universities that have received grants indicate a higher level of preparedness and resiliency when compared with institutions without grants. Thus, universities and colleges should work toward attaining the minimum standards such as NIMS compliance and so on to attract federal funds to improve their emergency management systems.

Network analysis results show that most universities and colleges collaborate with police, fire, and first responder agencies; offices of local emergency

management; and nonprofit agencies mostly for information exchange rather than financial support. Popular activities carried out with external partners are trainings, drills, and regular meetings for the purposes of reviewing emergency management plans. Least popular activities among these groups include the establishment of MOUs and MOAs. This needs to be addressed as literature suggests that establishing formal relationships and assigning roles and responsibilities prior to any emergency is crucial to mitigate threats and manage disasters.

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Bios

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