2006-1718: STUDENT SERVICE LEARNING IN THE WAKE OF HURRICANE KATRINA

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Student Service Learning in the Wake of Hurricane Katrina

Introduction

Within seven weeks after Hurricane Katrina devastated parts of Louisiana, Mississippi, and Alabama, more than 100 students and staff from the University of South Carolina arrived in Biloxi, MS to participate in a service learning relief effort. The South Carolina Commission on Higher Education defines service learning as follows:

> *Service learning is college student learning at any level and in any situation that is linked in a direct, hands-on fashion to the resolution of a problem or concern in a target community outside the institution.*

During this trip, the students of the University of South Carolina fulfilled this definition through the use of their hands and their hearts to help the victims of Hurricane Katrina in the Gulf Coast region. With the aid and logistical support of the Salvation Army, this project was a true service learning collaboration with a non-profit organization and a major research university. Working with Salvation Army volunteers, students provided on-the-ground support to those directly impacted by this disaster. The particular hands-on work that was performed included general cleanup, home restoration, the preparation and delivery of food and water, the preparation of care packages, and the organization of the staging area and warehouse for the Salvation Army. At the same time, this relief effort offered a unique opportunity to use the observations and experiences of more than 100 students to fully capture the impacts of Hurricane Katrina on the infrastructure. In this way, non-engineering students were exposed to the role of civil engineers in disaster mitigation and relief. Thus the service learning aspects were expected to be multi-fold.

Chronological and Logistical Development of Relief Effort

A relief effort of this magnitude had not been coordinated before by the university, so there was no blueprint or model to follow. Making it more challenging was the fact that fall break was the ideal target for such an effort, but the four-day break (October 13-16) was scheduled less than seven weeks after Hurricane Katrina hit the Gulf Coast. That being said, however, the critical planning occurred within the first two weeks after Hurricane Katrina. It was during that time period that the two main challenges, cost and logistics, were resolved.

The logistics of the relief effort were managed by coordinating with the local Salvation Army offices. The decision to focus the effort in Biloxi, MS was made in conjunction with Captain Ethan Frizzell of Columbia, SC. He had been assigned to Biloxi immediately after Hurricane Katrina hit the Gulf Coast, and he was familiar with the Salvation Army operations and needs in that region. The Salvation Army had purchased a football stadium, Yankie Stadium, from the city of Biloxi prior to the hurricane, and those facilities were converted into service operations headquarters to support the local public and volunteers. The Salvation Army offered to shelter the university relief team at Yankie Stadium, which was critical because hotels and motels in the region were either closed due to damage or full with evacuees and personnel from federal agencies like FEMA. Yankie Stadium provided a place to sleep on the ground under a large tent; bathrooms and showers; and three meals per day, served by the Southern Baptist Convention

and/or the Salvation Army. There was also a medical room on site that was staffed by doctors and nurses who volunteered from across the country.

The cost of the relief effort was another concern, although the potential costs were reduced significantly because food and lodging were covered at no expense. The budget for this trip was approximately $15,000. This included two chartered buses (drivers and gas), food and beverages to and from Biloxi, medical supplies, and some work clothes. Each participant was provided with one pair of boots, one pair of gloves, and three tee shirts, one for each work day. The Student Government provided funding for transportation, student clothing, and medical supplies. Sodexho, the catering and food service provider for the university, generously donated over $1,000 worth of pizza, snacks, fruit, bottled water and sports drinks. Students who participated in the relief effort did not have to bear any of the costs.

Table 1 details the chronological development of the relief effort. Once the relief effort received final approval and the arrangements were complete, an email announcement was distributed throughout the university on September 16. The announcement reads as follows:

The University of South Carolina and the Salvation Army will take 106 students to the Mississippi Gulf Coast during Fall Break, Oct. 12-16, to help with the Katrina disaster relief effort. Participating students will restore homes and businesses and help displaced victims. The Salvation Army is handling arrangements for the USC Katrina relief team effort. Capt. Ethan Frizzell of Columbia's Salvation Army office will accompany the USC team who will stay at the Salvation Army headquarters in Biloxi, Miss. The project is sponsored by the Department of Student Life, Office of Student Involvement and Leadership, Carolina Service Council, and the Salvation Army. The USC Katrina relief team will leave at 5 p.m. on Wednesday, Oct. 12 from the Russell House via bus and return at noon on Sunday, Oct. 16. USC will begin accepting student applications for the Fall Break service project on a first come, first served basis beginning at 8:30 a.m. on Wednesday, Sept. 21. The Salvation Army will provide meals and lodging. Applications can be downloaded from the Community Service Website at www.sa.sc.edu/ocsp and are available in the Russell House University Union, Suite 227. No group registrations will be accepted.

Table 1. Chronology of Relief Effort in Biloxi, MS

Date(s) in 2005	**Action**
August 28 – 29	Hurricane Katrina strikes New Orleans, LA and other parts of Gulf Coast
August 30 – September 16	University planning for relief effort
September 16	University-wide announcement to USC faculty, staff, and students through blanket email distribution and web posting
September 21	Student registration opens on a first-come, first-served basis and closes within one hour
October 6	Mandatory pre-trip meeting with registered students
October 11	Relief effort coordinators (Capt. Ethan Frizzell, Dr. Clay Bolton, Dr. Charles Pierce) arrive in Biloxi, MS via private plane
October 12 – 13	Students and staff depart Columbia, SC on two charter buses (5:00 pm) and arrive in Biloxi, MS (~3:00 am)
October 15 – 16	All depart Biloxi, MS (~5:00 pm) and arrive in Columbia, SC (~3:00 am)
November 2	Town Hall Meeting with staff and students who participated in relief effort held on campus and open to university, local community, and media

On the morning of the registration day, the 106 student slots were filled within 50 minutes. Students who were still in line were put on a waiting list. It should be noted that the number of student slots was limited by the number of seats available on the two buses. More students could have been allowed to participate if another bus was chartered, but this action would have increased costs significantly. One more seat became available when one less staff member was needed for the trip, which increased the total to 107 students. It was expected that approximately 10% of students would withdraw their applications or simply not show up for departure on October 12, but only two students cancelled on that day. Thus the final number of participating students was 105.

Student Distribution

A wide range of students participated in the relief effort, as illustrated in Figure 1. The majority of students were undergraduates, and the distribution of those students was nearly equal among freshmen, sophomores, juniors, and seniors, as shown in Figure 1a. In addition, 13 graduate students also participated. The distribution by gender and by academic major was less balanced. Approximately 70% of the students were female and 30% were male. As shown in Figure 1b, nearly half of the students were enrolled in the College of Arts and Sciences. Given that this is the largest college in the university, such a high representation is not surprising. Included among these students were three highly trained emergency medical technicians (EMTs), who were specifically asked to participate. The other half of students were enrolled in a total of eight colleges or schools.

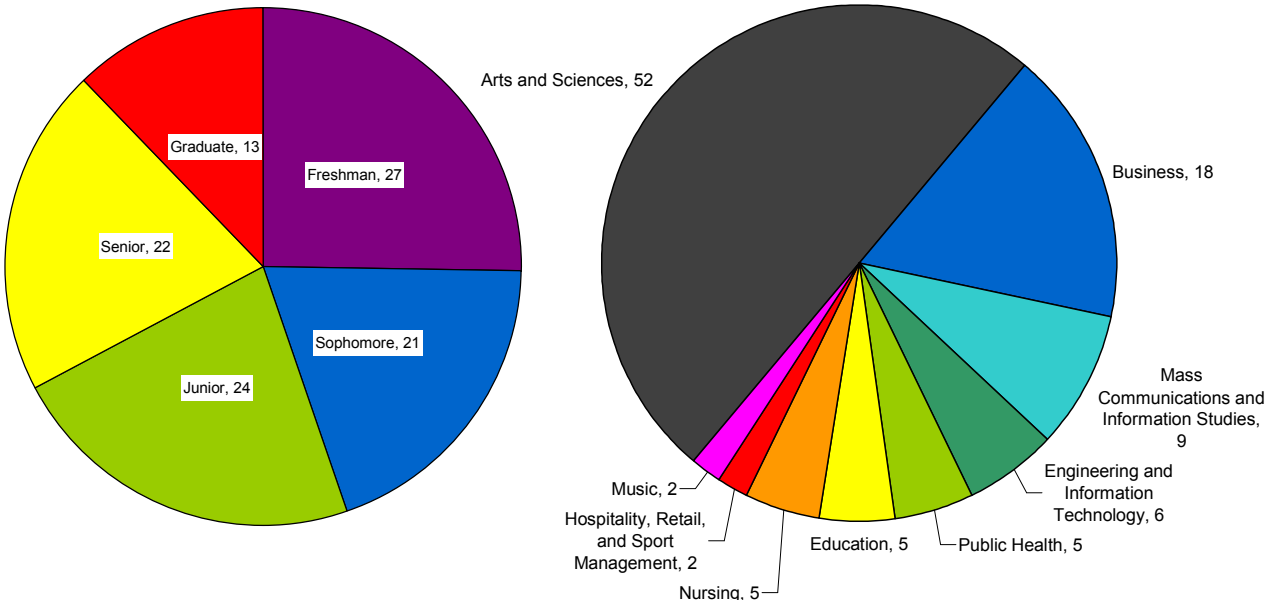

Figure 1. Distribution of Student Participants by a) Academic Class and b) College or School

Of particular interest for this paper is the fact that only six students, or less than 6%, were enrolled in the College of Engineering and Information Technology. This means that almost all of the student participants were pursuing non-engineering degrees. It is this fact that was most intriguing and challenging from an engineering outreach perspective. In other words, how can non-engineering students learn about the engineering implications of this disaster through their service experience?

The 105 students were divided into five work groups of 21 students. Each group was assigned to a staff member who was responsible for supervising the daily work schedule and monitoring the students. The five staff members included the Director of the Russell House University Union, the Director of Housing and Residence Life, the Director for Alcohol and Drug Programs, a Department of Athletics Academic Advisor, and a Methodist Chaplain from the Campus Ministry Center. Group assignments rotated during the three-day relief effort and included general clean up and support services at Yankie Stadium; loading and unloading of goods and supplies at the Salvation Army warehouse; distributing meals across three counties on Salvation Army canteens, which are mobile food units; and cleaning out homes and yards in the immediate vicinity. The starting location of each assignment was within walking distance of Yankie Stadium. Each day, two of the five groups were assigned to clean homes. Because of health and safety concerns, two of the three student EMTs were always assigned to the home cleaning groups. The third student EMT was stationed at the warehouse. While several minor injuries were sustained during the trip, there were no major incidents.

Student Documentation of Observed Damage

Damage in Biloxi was extensive, and in many locations there was complete devastation of homes and other structures. Since students came from many disciplines within the university, one of the challenges was to educate non-engineering students about hurricane-related damage and how civil engineers play a role in the design, construction, and in this case, reconstruction of the infrastructure.

To facilitate student learning, a one-page assignment sheet was distributed to all students during the bus trip to Biloxi, MS. The sheet describes how each student should document their observations through photographs and in writing. The assignment sheet is shown in Figure 2. Each one of the five work groups was provided with a digital camera to photograph the extent of damage at their respective work sites. Students were discouraged from bringing personal digital cameras because of the unknown conditions in Biloxi, but a large number of students brought disposable cameras to capture their observations with photographs. In addition, each student was provided with a water-resistant, pocket-sized field journal to document their observations of damage in and around Biloxi. Having these journals offered students the opportunity to write about their emotional experiences as well.

Students were asked to temporarily return their field journals at the end of the trip. The return rate was less than 20%. The following observations are based on those journals that were returned to the authors.

USC Student Relief Effort in Biloxi, Mississippi
Fall Break 2005

Documenting Your Observations in Writing

Each student is being provided a field notebook. The notebooks are small and are designed to fit in your pocket, so take them with you each day on your work assignments. Write in them whenever you can. Because the notebooks are small, you will have to write small too. The notebooks are also water-resistant, but try not to get them soaked! Each notebook will be collected after the trip, but will be returned to you when we are finished.

1. On the *first page* of the notebook, write the following:

First and Last Name
Hometown and State
Major
Year (Fr, So, Jr, Sr, Grad)
Local/Campus Address
Email

2. Starting on the *second page* of the notebook, answer the following two questions:

"What do civil engineers do to help prevent disasters like Hurricane Katrina?"
"How do civil engineers help in relief and recovery efforts?"

Answer as best you can. If you are not sure what civil engineers do, ask a friend or make an educated guess. There is no right or wrong answer. All answers will be valued. Use as many pages as needed.

3. Use the *remaining pages* of the notebook to document what you see while working in Biloxi. Your observations will be used in research to determine the extent of damage in Biloxi from Katrina, so it is really important that you take notes.

Feel free to note anything that you observe. Do your best to describe in detail what you see. In particular, here are some things to look for while working in Biloxi:

Damage to homes and other buildings
How much damage can you see on the exterior (like doors, windows, siding, roofs)? Does the home seem to have been moved off of its foundation?
How much damage is inside the home (to walls, floors, ceiling, furnishings, appliances)? Does it look like the home was flooded?
Is there mold inside the home, and if so, how much?

Damage to streets
Are there places in the street that seem to be falling apart?
Are the sides of the street sliding away?
Are streets covered in debris or mud?

Environmental damage
How many trees are missing branches or completely knocked down?
Are shrubs torn away?
Is the grass in yards or other places torn up, brown, or dead in spots?
How much of the ground is covered in debris or mud?
Does the ground look like it's been washed away in places?

Documenting Your Observations with Photographs

At least one digital camera will be available in each work group. Please use these cameras to take photographs of damage that you see. Any student can use them. Just ask your work group leader. Of course if you bring your own camera, take lots of pictures!

Questions?

If you have questions during this trip about hurricane damage, ask for Dr. Charlie Pierce. He is a professor in civil and environmental engineering, and he will be participating in the relief efforts. If you take digital photographs with a personal camera and you are willing to share them, please email your photos to Dr. Pierce at piercec@engr.sc.edu.

Figure 2. Copy of Assignment Sheet to Guide Students' Observations of Damage

The next two subsections contain a summary of student responses to the two questions posed in Figure 2 about the responsibility of civil engineers before and after a natural disaster. Excerpts are listed in no particular order from journals of non-engineering students.

"What do civil engineers do to help prevent disasters like Hurricane Katrina?"

1. design and engineer roads, bridges, levees and buildings to withstand a storm
2. city planning; design levees, structures, roads and bridges
3. plan and build structures to withstand forces like weather

4. design dams and levees to prevent flooding; manipulate the environment to make it as safe as possible
5. recognize that towns are in a hurricane zone and are by nature in the path of destruction; plan ways to minimize the chance of structures being destroyed; if civil engineers "shape society" then they should try to shape it so people are drawn away from the coast
6. perfect building structures in order to prevent disasters like Hurricane Katrina; create structures to withstand heavy wind and rain
7. design structures to be weather resistant and sturdy
8. plan evacuation routes; plan sewage systems; anything to do with the city
9. help people evacuate in an orderly manner to minimize death; build structures, bridges and roads to withstand forces
10. prepare communities for disaster; organize how to evacuate and re-house residents; there is little they can do to prevent the hurricane but they could reduce its effects on the population … alert people in advance and forewarn them of the situation and challenges ahead
11. the more people who are able to evacuate, the better; build bridges well enough so that they can stand Mother Nature; if highways are built strong they will advance the clean up of the disaster
12. design dams and levees to prevent flooding

"How do civil engineers help in relief and recovery efforts?"

1. evaluate the system of dams and levees and make necessary changes
2. rebuild roads and bridges that allow evacuees to return home; aid the area in returning to levels of functionality
3. assess structural damage; determine whether what's left is safe or not; planning how to rebuild
4. reconstruct buildings; assess structural damage
5. study what went wrong and decide how to make it better based on their data
6. fix the design flaws that contributed to damage; look at what went wrong and develop new methods of construction; volunteer to clean up
7. plan how to best administer aid; plan how to rebuild; get all trash out
8. observe disaster areas and find out what worked and what didn't
9. survey the damage to see what the problems were to structures that fell
10. judge whether or not a structure is safe to enter or whether or not it should be condemned
11. organize the bulldozers and tree surgeons to clear the area as soon as possible; since they know about the population, i.e. demographical statistics, they should be able to use this knowledge effectively (for example, knowing how many young children need care)

There are some interesting trends in the student responses. First and foremost, these non-engineering students seem to have a reasonable grasp of what civil engineers do, at least in preparation for and in response to a hurricane. However, it is not known if these students were aware of civil engineering before this relief effort or if they acquired information by asking for help, as suggested in the assignment sheet shown in Figure 2. In either case, it seems as though the questions succeeded in provoking thought and discussion on the topic of civil engineering. Second, it is noteworthy that one-third (4 of 12) of students specifically mentioned that civil

engineers design and build levees. This is most likely a direct result of those students associating civil engineering with the failure of levees in New Orleans. One-third of respondents also mentioned that civil engineers are responsible for evacuation, which is also a probable result of the lack of complete evacuation in places like Biloxi and New Orleans. Third, some students used insightful language to describe what civil engineers do. For example, phrases like "*perfect* building structures" and "*manipulate* the environment" and "*shape* society" represent powerful perceptions of the civil engineering profession. Fourth, most students recognize that civil engineers are responsible for damage assessment and subsequent reconstruction efforts. The fifth and final observation is a striking and unexpected one. While they did not describe it in such terms, several students pointed to the importance of post-hurricane research. For example, one student stated that civil engineers should "look at what went wrong and develop new methods of construction" while another said in a similar manner, "study what went wrong and decide how to make it better based on their data."

From this trip, a large collection of photographs has been assembled. A sampling of photographs is provided herein with excerpts from student journal entries. Figures 3 and 4 show a series of photographs of a light tower that collapsed onto the stadium bleachers at Yankie Stadium. Beneath the bleachers, tensile failure of several reinforced concrete beams was evident, induced by the impact of falling lights. One of the non-engineering students described it this way: "One of the huge light towers had blown over and landed on the bleachers and had knocked a huge hole into the cement." A civil engineering student described it as follows: "Stadium light post bent in half; concrete stadium underneath was crushed, exposing rebar from impact."

Figure 5 illustrates the range of damage observed amongst homes in the area. A large number of homes were washed off their foundations from the storm surge. Figure 5a shows two homes that were partially moved into the street, and as a result, suffered severe structural damage. Figure 5b, on the other hand, is an example of new home construction that survived with little to no damage other than interior flooding.

a) b)

Figure 3. Yankie Stadium Light Tower a) Collapse onto Stadium Bleachers and b) Damage to Reinforced Concrete Beams

a)

b)

Figure 4. Yankie Stadium Light Tower a) Bent Over Stadium after b) Pull Out Failure of Foundation Slab

a)

b)

Figure 5. a) Two Severely Damaged Homes Washed into Street and b) New Home Construction with No Structural Damage

Most of the students commented on the condition of homes in their journals. Example observations are listed here. "Houses shifted off of their foundations, sometimes halfway in the road. Some houses buckled in half." "Most houses had been moved off their foundations, some worse than others. Some houses looked pretty intact from the outside, but through the windows and doors you could see that there was nothing left inside. Then you'd turn a corner and there

would be a completely flattened house. The walls jutted out and the roof was flat across them." "Houses collapsed, moved from foundations. Random walls strewn about. Others totally gone, with only an outline of what used to be four walls." "To see one house completely blown into another and the two of them [in] a jumbled pile … can't even be described in words or pictures."

Figure 6a shows piles of debris being removed along the street where one student group was cleaning a home. The extent of debris along and across the roads was staggering and almost endless. "Trash piled in the streets and strewn everywhere – even in tree tops and on roofs." "The streets, straight and deserted, were lined with piles of trash and debris. We had to be careful to avoid wires and fallen trees." Figure 6b shows one of the eight homes that was cleaned and gutted by the students down to the frame.

a) b)

Figure 6. a) Street Collection of Debris from Home Cleaning and b) Interior View of One Home after Cleaning

Lessons Learned

While the relief effort was remarkably successful, there are a number of improvements that should be made in preparation for future experiences. Some of those improvements include:

1. Conduct as much site reconnaissance as possible in advance of student arrivals. The primary relief effort coordinators (Capt. Ethan Frizzell, Dr. Clay Bolton, Dr. Charles Pierce) arrived in Biloxi, MS about 36 hours prior to the students. While this was adequate, having another 24 hours on the ground would have been more effective. Much of the reconnaissance involved assessing and mapping homes for potential cleanup and communicating with the homeowners. It cannot be understated how important this preparation time is for a successful student service learning experience.
2. The student EMTs served an important role in the student groups. They treated a small number of minor injuries while students were working. Having three EMTs was

sufficient, but it would have been less complicated to assign one for each of the five groups.

3. The number of tools and trash bags at some homes was sometimes insufficient and slowed down progress. A standard "toolbox" should be developed for each group that contains more than enough tools and supplies.
4. Inexpensive digital cameras purchased for this trip were not reliable and the photographs acquired were of somewhat low quality. Four of the 12 cameras were damaged or did not retain images. Disposable cameras are better and should be recommended. Digital images can still be acquired on CD from these cameras when the film is processed.
5. Many of the field notebooks were lost, left unused, or not returned. A better management and reward system needs to be in place to convince more students to use their journals.

Recommendations

The partnership between the University of South Carolina and the Salvation Army proved to be a fruitful one. Based on numerous student comments, the service learning experiences of these students was clearly enhanced because of the Salvation Army's organization and management in Biloxi, MS. Because they are a large but flexible organization with a proven record of disaster relief and recovery, the authors strongly recommend that other universities partner with the Salvation Army to develop relief efforts like this one for their students.

To that end, the authors are working with Captain Ethan Frizzell to develop a national model for the Salvation Army based on this partnership. This model will strongly encourage hands-on activities. As Captain Frizzell stated, "Some volunteer groups want to see a lot and help a little. Students want to see a little and help a lot." It is recommended that a standard package be created that can be disbursed to colleges and universities nationwide. This package will contain details of how to organize a joint relief effort in the event of a disaster and include contact information for the local Salvation Army offices for each institution. The vision is that student groups could be assembled from across the country and rotated in and out from a disaster recovery site. This way, there is a continuous presence from higher education institutions instead of student participation in a random, piecemeal fashion.

It is also recommended that more faculty members be integrated in these relief efforts to enhance the student service learning experience. The first author served as a roaming leader during each service day and provided input on the damage observations as well as encouraged discussion about a number of civil infrastructure issues. Having additional faculty members participate from other disciplines related to disaster relief would have created a more diverse learning environment.

Acknowledgements

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