



Natural Hazards Research and Applications Information Center  
Campus Box 482  
University of Colorado  
Boulder, Colorado 80309-0482

HAZARD HOUSE COPY

THE RECOVERY OF SCHOOLS FROM EARTHQUAKE EFFECTS

Vivian Gratton  
Herbert D. Thier  
Elia Arjonilla  
Rosa Melgar

1986

Quick Response Research Report #09

This publication is part of the Natural Hazards  
Research & Applications Information Center's ongoing  
Quick Response Research Report Series.  
<http://www.colorado.edu/hazards>

## **The Recovery of Schools from Earthquake Effects Lessons from Mexico City**

### **Introduction**

There is hardly a school which does not have some form of disaster preparedness training. The majority of this training has been targeted at preventing injury during fires. Sometimes students and staff have received preparation, such as first aid training, for surviving the initial effects of the disaster. Very rarely have there been any exercises targeted at recovering from a disaster. (1)

Appropriately, preservation of physical well-being has been the first aim of school disaster preparedness programs. Many lives have been saved and injuries prevented at school and at home by the extensive fire drill programs in the United States. Unfortunately, with the exception of fire safety, little disaster preparation takes place in schools in the United States. Many teachers, parents and administrators have recognized that these programs are not enough -- particularly in localities where large natural disasters, such as earthquakes and floods may occur. While this concern has been primarily focused on hazard mitigation and the development of immediate response emergency preparedness programs, interest has recently been rising in long term recovery. CALEEP was recently asked to make a presentation to superintendents of southern California school districts who have begun to wonder what they will do after a serious earthquake. The recent Mexico City earthquake and the resulting damage to schools caused these school administrators to consider how they will cope

with the long term stress put on the operational and social systems of the schools. Fortunately, the high degree of structural safety built into California public schools as a result of the Field Act (2) greatly reduces the possibility of calamitous building failures; nevertheless, nonstructural damage can be costly. Damage to schools in the California Central Valley city of Coalinga from the 1983 earthquake (6.5 on the Richter scale) was estimated at \$2.3 million, or approximately \$1000 per student! Schools were still awaiting plumbing repairs many months after the quake (3). An extrapolation of this damage figure to school districts the size of Los Angeles, or even Fresno, is enough to frighten any administrator or school board member in a disaster-prone area.

A number of Mexico City schools suffered significant damage in the September 19 and 20, 1985 earthquakes. Approximately 760 schools were damaged, and 20-25 collapsed completely. Fortunately, few schools were in session when the shaking occurred; however, school communities were strongly affected by the damage to both physical and social structures. Colegio Madrid, a school of 3000 in the south of the city was severely damaged, with the middle school and high school (secundaria and prepatoria) buildings rendered unusable until major repairs were made. Only the kindergarten, elementary school and auxillary buildings were left to accomodate the entire school community. The story of how this school has responded to the effects of the earthquake is a lesson in workability -- what needs to happen to meet a commitment -- in this case a commitment to quality education and safety for to all

who study and work at the school.

The actions of Colegio Madrid cannot be exactly duplicated at other schools, for the means by which a school responds to crisis reflects its own particular operational organization. Nevertheless, this lesson in workability retains its applicability. Colegio Madrid provides an example of how a school community may clearly define its purpose and priorities and work collectively to meet these goals. The insights gained in such a study reach beyond earthquakes and disasters to touch upon the structure of educational institutions and programs.

#### Colegio Madrid

The California Earthquake Education Project (CALEEP) (4) visited Colegio Madrid three times -- November 1985, and January and February 1986. These investigations were supported by a National Science Foundation Quick Response Minigrant (5), and by a special appropriation from the California State Seismic Safety Commission (6). Physical and operational changes, made in response to the earthquake of September 19, 1985 were identified through direct observation and interviews with administrators, faculty, parents and students. (5) In the process of carrying out these interviews and observations, much was learned of the underlying structure of the school and its methods of communication and decision-making. This basic structure provides a context for the interpretation of the choices made by the school community in response to the effects of the earthquake.

Colegio Madrid is a private school, as are many schools in Mexico City. Begun in 1941 by exiles from the Spanish Civil War,

the school operates as an "extended family," serving students from both Mexican and Spanish backgrounds. (7) The student body is primarily upper middle-class, and most graduates go on to university studies. Because many students remain with the school from pre-school to high school, and alumni are often involved with the school as parents, teachers and advisors, there is a tremendous sense of community and continuity at the school. This allegiance extends to members of the custodial staff, some of whom have been with the school for thirty years. The school is administered by a general director, Christina Barros, who is advised by a board of governors (Junta de Gobierno), which represents a general assembly. Under Sra. Barros are directors of each of the four schools: kindergarten (ages 2-6), primary school, middle school and high school. These directors have considerable autonomy in the management of the individual schools; they are responsible for curriculum, for hiring and firing, and for relations with parents and the education authorities. In addition to academic directors, there is a business manager and a facilities and personnel manager for the whole school.

Prior to the earthquake the school community enjoyed ample facilities at its new (1979) campus. Each of the four schools occupied its own building, separated from the others by fences; there was also an auditorium, and administration and library building, sports facilities and shops.

Particularly striking among observations of school life is the high degree of equity among students, and members of the custodial, academic and administrative staffs. There are no

reserved parking spaces for teachers or directors. Students are taught to treat the custodians with respect and courtesy. High school students frequent the administration building; these students are not being "sent to the principal," but are simply coming in to chat or share a cup of coffee with an administrative staff member! This openness and equity, that sets Colegio Madrid apart from many of its contemporaries, provides some insight into the way that the school responded to the effects of the earthquake of September 1985.

#### Response to the Earthquake

The earthquake that struck Mexico City at 7:19 a.m. on September 19, 1985 seemed like a small tremor to most Colegio Madrid students, still at home, or on the way to school. For those at the school site, the experience was much different. One class was in session on the second floor of the high school building. Most students in this class reported that they had, under the teacher's direction, stayed in the room, but had, again by teacher suggestion, left the room before the shaking was over. Two students did not stay in the room. They reported:

"We didn't obey the teacher when he said to remain in the room. We ran through the hallway and reached the stairs. It was difficult to decide whether to enter into them or not, because of the noise they made striking the building. Finally we started to descend, but it was very difficult because the shaking would send us from one balustrade to another. One of us even fell down in the middle of the stairs..." (8)

Other students recounted their experience leaving the building:

"When we realized that the quake was longer and stronger than anything we had felt before we tried to get outside, but it was too late. We lost some more time when one of our classmates blocked the door, and besides, by that time, the movements of the building didn't let us walk. Then we tried to reach or get close

to the columns -- as the teacher said -- and there we embraced each other."

Considerable panic, and very likely, injuries, would have arisen if the earthquake had occurred when the school was fully occupied. There had been no training of students or staff members in response to earthquakes or fires.

Colegio Madrid was fortunate because roads and other life-lines surrounding the school were not significantly damaged. No one was trapped at the school and dependent on it for water, first aid, and food, for which no provisions had been made.

Most school preparedness programs only consider survival during the earthquake itself and endurance of possible isolation from public services for a brief period of time. Colegio Madrid fortunately bypassed the potential consequences of its lack of preparedness in these two areas. Either by such good fortune, or by good preparation, another school may find itself in a similar situation after an earthquake -- glad to have survived the shaking with no loss of life or serious injury, and overwhelmed with the job of recovery that looms ahead. The following account details some of the decisions and actions involved in the recovery of Colegio Madrid from the earthquake's effects. This account is not a compendium of problems to be addressed in recovery; rather it is a study of the process of decision-making and action-taking by a school community in response to the physical and social upset of an earthquake. In studying the recovery of Colegio Madrid from the earthquake's effects, it is important to bring to mind other possibilities that existed for decision-makers, and to consider how these alternatives would have changed

the recovery path of this school.

The tasks that Colegio Madrid faced on September 19 included: remodeling of the school so that classes could resume as quickly as possible, repair of damaged buildings, reinforcement of undamaged buildings, and coping with the fear and anxiety experienced by staff, students, administration and parents. Secondary to the difficulties involved in remodeling and repair were the changes to school organization and social interaction that resulted from changes in use of space and facilities at the school. For instance, private conversations became much more difficult, and bathroom facilities became heavily taxed. In addressing these problems a number of factors came into play, and priorities began to appear as trade-offs were made. Important factors that influenced decisions, directly or indirectly, included:

- safety of all those at the school
- expedience of returning to coursework
- psychological well-being of the community
- commitment to non-hierarchical decision-making
- cost of repairs and safety measures
- personal agendas of decision-makers
- technical knowledge
- expectation of external aid
- expected contributions from within the community.

Immediately following the earthquake the school was inspected by engineers and architects, who determined that the high school and middle school required major repairs and that the



primary school needed minor work before they would be safe for occupancy. 1400 of the 3000 students were displaced and all laboratory facilities were lost. Several options were available: rent buildings off campus to hold classes, remodel buildings so that classes could continue on campus, or offer two school sessions, one in the morning and one in the afternoon. These choices were set before the academic, administrative and custodial staffs at a meeting held on September 24, five days after the earthquake. Participants were asked which choice they preferred, and if there were other possibilities that might be considered. The overwhelming response was to remain on campus, and to remodel facilities so that all students could be in school at the same time. A number of individuals commented on the importance of this meeting. The sacrifices that would have to be made in order to continue all classes at Colegio Madrid were not small, and it was important that the decision to make those sacrifices came from staff members.

Parents of students met the following day. Presentations by engineers were reassuring, and, yet, upon seeing the damage to the buildings, many were concerned for the safety of their children. Two committees arose out of this meeting: a technical committee composed of engineers and architects who would follow the repair and reinforcement progress, and a safety committee, composed of sociologists and health workers, who would help with both the psychological recovery of the community and with improving school safety and preparedness. In addition, families offered to contribute financially to the cost of repair work. Conflict, as well as support arose at this meeting. There were

some parents and teachers who did not have confidence in the information presented by the administration -- regardless of the fact that the administrators, too, had children at the school. This conflict seemed to arise out of a need to find someone culpable for the potential danger that the children had fortunately escaped -- and a sense that as parents they were responsible for making sure that their children were safe at school. No one prevented their children from attending school for this reason, but this conflict persisted and consumed much energy of teachers, students and administrators, as they became involved in this "political problem." The renewed involvement of parents in the school as a result of the earthquake provided critical support -- which had strings attached. Along with the concern that engendered support was the concern that brought conflict; both were expressions of parents' taking responsibility for their children's safety.

Immediately following these meetings work began on preparing the school to open on October 7. Custodians and older students contributed many extra hours in cleaning damaged rooms, partitioning classrooms, lobbies, and libraries, and moving equipment, furniture and supplies. Even the breezeways outside of the primary school and kindergarten were utilized. These areas were boarded off to form classrooms and teachers' lounges. Custodians and teachers donated their lunchrooms to the students. Administrative staff shared offices, and elective classes and lab classes were moved outside. The primary school was repaired so that it would meet safety standards. Several aluminum temporary

buildings were bought and installed. Finally, three weeks after the quake, the seemingly impossible task of doubling the capacity of usable buildings was accomplished and students returned to school.

### Recovery

The work of accomodating displaced students was far from complete. Immediately concerns were voiced. It seemed that every solution brought new problems. The partitions in the library which allowed for additional classrooms also obstructed exit routes. Some temporary classrooms were so large that curtains had to be hung to reduce sound loss. Custodians were kept busy opening up extra doors, cutting away the fences that previously separated the different schools, and painting exit and evacuation paths throughout the school grounds. The parents' Safety Committee was integral in enacting these changes. Custodial, academic and administrative staff and students brought their concerns and suggestions to the committee, two members of which, Rosa Melgar and Elia Arjonilla, were always on campus. This committee had prepared itself to evaluate safety needs and make recommendations by attending conferences on school safety, consulting with specialists in psychology, education, physics, engineering and seismology. The recommendations that they made to the administration were quickly addressed. On a tour with the committee on the first day of a three-day visit, it became apparent that an extra exit was needed at the back of the auditorium. Plans for this door were already in progress two days later.

Because of the timeframe for repair of the two damaged

buildings is approximately two years, Colegio Madrid must continue to cope with the effects of the earthquake when many others in less-damaged areas have let the memory of September 19 recede. As time passes the inconvenience of temporary measures becomes burdensome. The breezeway classrooms were abandoned by the February 1986 visit; faculty and students preferred the noise of sharing a classroom over the cold of the boarded-in classrooms. The lack of a home for the senior students was also becoming a sore spot, and plans are being made for special programs for these students to help them build unity in spite of the dispersal of their classrooms and social gathering places.

The efforts of physical recovery from the earthquake's effects could easily consume the total time and energy of staff and volunteer committees. However, it was not enough for the school to return to its previous state; awareness of the risk of future earthquakes and other disasters had increased. One of the primary objectives of the Safety Committee was to improve the school's preparedness for aftershocks and future earthquakes. Melgar and Arjonilla reported that this task, seemingly a simple copying of other schools' programs, proved to be more difficult than originally thought. A number of factors which were unique to the Mexico City earthquake and the school came into play, among which were:

- the absence of safety plans in the schools or in the city in general
- the frightened state of students who continued to experience the disaster via television, stories, and personal experiences in assisting with rescue and aid
- the erroneous listing of Colegio Madrid in the newspaper as one of the buildings to be demolished

- a "political problem" which involved many of the senior students and reached a climax when one teacher was fired.

It was clear to Melgar and Arjonilla that something more than the duplication of another school's procedures was necessary. (10)

The Safety Committee quickly developed an emergency response plan for the school, employing knowledge gained in their studies, their consultations with specialists, and their experience as professional sociologists. A majority of the students had been trained by October 29, when a noticeable aftershock struck. This aftershock provided a real test of the efficacy of the work of the Safety Committee. At the time of the aftershock, many teachers were out of the classroom attending a meeting related to the political conflict. Nevertheless, students quickly evacuated to the soccer field, and waited there as staff members carried out a search of buildings, and word was given that it was safe to return to the classrooms. This event, which had the potential to increase the fear of parents, students and teachers, instead resulted in reassurance of the safety of children at the school. Melgar and Arjonilla told of the parents' response:

"Because of the hour of the day many parents were still at the school cafeteria, or at their homes close to school, and quickly came in to see what had happened. But the minute they saw their children they didn't even try to get close to them, much less to take them home...None of the children asked to be sent home. One of the mothers said, 'I'd rather stay here than go back where I live!'" (11)

This increased concern for safety has been institutionalized. Custodians now have responsibility for the upkeep of exit routes and markers, a number of high school students and teachers have received first aid training, and emergency instructions have

been posted throughout the school for visitors. Most importantly, emergency drills have become a regular practice at this school which had not had any preparation for disasters previous to the earthquake. Carmelita Paz, facilities manager, noted that the campus is not only better prepared for earthquakes, but also for fires and more common accidents and injuries.

### Psychological Recovery

The administration of Colegio Madrid was quick to respond to the human needs for recovery from the effects of the earthquake. The community was not only affected by damage to the school, but also by their experiences of the earthquake outside the school. Although few had lost family members to the quake, many were active in the earthquake relief efforts. Many of the older students helped in the rescue efforts, experiencing their first real confrontation with death. Others helped with the encampments of homeless. Supplies of food, clothing, first aid, etc., were collected at the school and distributed by junior high and high school students and teachers. One student reported of his experience in these volunteer brigades, "I remember that after the first "brigade" (assistance to the homeless), the only thing that I could say was that anyone who would go and see the situation would not be able to continue to ignore the problem." (12) Young students were also very much affected by the experience of the earthquake. Children saw that adults were not able to control the earthquake or its effects. For many this was the first time that they had seen that parents and teachers were not capa-

ble of protecting them completely. This was a first for teachers, too, who recognized the weight of their responsibility for children in their charge. These psychological needs were addressed in a variety of ways.

During a meeting soon after the temblor, a seismologist and a psychologist addressed and worked with the teachers. The seismologist discussed the earthquake, its causes and effects, and answered questions about why Colegio Madrid and Mexico City had suffered as they did. The psychologist spoke of how the earthquake may affect childrens' behavior and then split the group into pairs, so that teachers could discuss their own fears about the earthquake. Ma Elena Gonzalez, kindergarten director, said that this opportunity for teachers to express their own fears was very important, as was the professional advice on handling the students. Not surprisingly, the greatest fear expressed was that the teachers would not be able to deal with their students' anxiety. Through discussing how to cope with this anxiety the teachers and counselors decided that children should be allowed to talk about the earthquake as much as they needed to. Further, the ability of children to help each other recover from the earthquake was respected. Laura Hueramo, director of the primary, told of how children at play would build structures and "make earthquakes." These games were no longer being played in January. Also working to relieve fear were the visits of the Safety Committee to each classroom to speak with the children about earthquakes as well as to give instruction on emergency drills and safety in the home.

School counselors found themselves busier than ever.

Eduardo Robledo, counselor for high school students noted that there is much more conflict with authority since the earthquake, and that this conflict has affected attention in the classroom. Speaking of this conflict, particularly as it related to the "political conflict," he explains:

"The adolescent students have used the political problem as a pretext to evade the confronting of a reality which is even more difficult than the shaking of the earthquake. This reality is the confrontation with death -- in a very violent manner -- presented to the students at a time in which they are questioning who they are, what to do in life, and whether it is better to work hard or to live easily. These questions are joined with the total experience that the disaster of the earthquake represented. Hence, the political discussion and dispute gave them the opportunity to occupy themselves in another thing and not to reflect and resolve their existential crisis: Is hard work of value? Why study? etc." (13)

These students cannot return to the trust in authority that the younger students have reassumed. The earthquake had an irrevocable effect on the attitudes of students and staff, and it is no surprise that this effect on the individuals within the school community causes conflicts that demand change. It will be interesting to see whether these changes remain permanent as the new steel rods in the buildings, or are only as temporary as the wooden partitions.

### Summary

This brief account of recovery only begins to address the many changes made at Colegio Madrid to adapt to the effects, physical, social and psychological, of the earthquake. Not explicit in the account is the attitude of members of the school community. There is a remarkable expression of "love for the school" among the students and entire staff. There was no doubt



that the school would recover from the disaster stronger than ever. It is common for groups to feel a stronger sense of unity immediately after a disaster. (14, 15) This unity rarely extends beyond the initial response period, at which time relations return to normal. This "love for the school" appears to be the normal state at Colegio Madrid, as it persists many months after the disaster occurred, and was noted by teachers as one of the characteristics that brought them to the school. This is not to say that anxiety and impatience do not arise; there continues to be conflict over the safety of buildings in use. It is noteworthy that the school administration did not hide these conflicts from researchers by restricting access to individuals or documents. Teachers and directors often commented that the school was strengthened by the way in which it met the crisis, not merely in its survival of the earthquake. Laura Fronjosa, director of the high school, explained, "You define yourself in the process of dealing with crisis. A crisis flushes out the conflicts that lie hidden or simmering during normal times." This strong sense of community was reflected in the attitudes of staff members. For example, Carmelita Paz, facilities manager, notes the change among the custodians: "Before no one did the job of the absent person; now all pitch in." The school has not just weathered the storm, but has used its impetus to make significant social as well as physical changes. Christina Barros commented that barriers between the students have fallen away with the dismantling of fences and the sharing of classrooms, and that a commitment has been made to find ways to retain the strengthened sense of community through such venues as special events and a

school magazine.

Conflict was not the only thing that surfaced with the Earth's tremors. Love of the school and commitment, that were not previously recognized or expressed, appeared as well. Christina Barros commented that before the earthquake she assumed the support of the school community; now she is assured of it. In the case of Colegio Madrid, this support of the school was strong enough for the community to envision solutions rather than only impossibilities in the loss of classroom space. Many other institutions have thrown up their hands and waited for assistance when faced with similar situations. This dependence on government and relief agencies to meet disaster needs is becoming untenable as the cost of natural disasters grow and the strength of local and world economies is being diminished.

Although there was no physical preparation for disasters of any kind prior to the earthquake, Colegio Madrid was well prepared in some very important aspects. The strong commitment of staff, students and parents was nurtured over many years. Particularly important to successful recovery was the commitment to working as a community. This commitment does not simply appear in emergency situations, but depends on a structure of communication and management that encourages group problem-solving. The existence of such a structure is rare and many may argue that it is prohibitively difficult to create such an atmosphere in today's schools. The underlying school district and state government structures and the transience of families frustrate efforts to build such community commitment. While Colegio Madrid does

provide possible solutions to problems caused by an earthquake, it does not provide all the answers for a school wishing to prepare itself for recovery. The process of coping with the stress of earthquake effects did clearly define the strengths and limitations of this school, just as such an experience will make obvious the unique strengths and limits of schools that have not yet undergone such an event. The issues of fear, incapability and conflict that Colegio Madrid faced are not unique; they will be confronted by all schools in their recovery from disasters. It is not necessary to wait for a disaster to begin this process of self-definition. By imagining how a school would handle these issues, what factors would come into play, and what problems might arise, school leaders may begin to address weaknesses and identify and strengthen those structures that ensure effective recovery. (16,17)

### Footnotes

1. The 1985 Guidebook for Developing a School Earthquake Safety Program gives detailed information on hazard assessment, earthquake drills, immediate response and communication, but gives no guidance on action to take for periods greater than 24 hours after the earthquake. (Federal Emergency Management Agency, 1985.)
2. The Field Act, originally signed into law after the 1933 Long Beach earthquake, and since upgraded, requires public school buildings in California to be constructed or retrofitted to meet stringent seismic safety standards.
3. Hayward, Steve & Bill Farrow, Earthquake Survey of Coalinga/Huron Joint Unified School District, June 14, 1983, Moorpark Unified School District.
4. The California Earthquake Education Project (CALEEP) is responsible for the development of curriculum and the training of leaders in activities and programs related to earthquakes and earthquake preparedness.
5. The National Science Foundation Quick Response Grants, administered through the Natural Hazards Research Council at the University of Colorado, allow researchers to respond immediately to disasters.
6. The California State Seismic Safety Commission is composed of specialists in earthquake related fields who serve to propose and advise on measures that will increase earthquake preparedness in the state of California. One of these measures is the institution of the California Earthquake Education Project.
7. Interviews were conducted in a combination of Spanish and English, hence all comments by Colegio Madrid personnel are paraphrased unless otherwise noted.
- 8 & 9. Interviews with students were compiled and translated by Elia Arjonilla and Rosa Melgar.
10. Arjonilla, Elia & Rosa Melgar, personal communication, July 1986.
11. Arjonilla, Elia & Rosa Melgar, personal communication, July 1986 (direct quote).
12. Figueroa, German, "Nosotros Ahora," Colegio Madrid, Year 1, Number 1, June 1986, p.3.
13. Robledo, Eduardo, interview with Rosa Melgar and Elia Arjonilla, 1986.

14. Dynes, Russel, 1970, "...during the emergency period a consensus on the priority of values within a community emerges; a set of norms which encourages and reinforces community members to act in an altruistic fashion develops; also a disaster minimizes conflict which may have divided the community prior to the disaster event." p. 84, *Organized Behavior in Disasters*, D. C. Heath and Co., Lexington, MS.
15. Fritz, Charles E., 1961, "This...merging of individual and societal needs provides a feeling of belongingness and a sense of unity rarely achieved under normal circumstances..." p. 100, *Contemporary Social Problems*, (Merton, Robert and Robert Nisbet, ed.) Harcourt, Brace, and World, New York.
16. See Gratton, Vivian G., "Recovering from Disasters: Scenarios for School Communities, Trial Testing Draft," California Earthquake Education Project, Lawrence Hall of Science, University of California, Berkeley, California, 1986, for scenarios to use within school communities to increase preparedness for earthquake recovery.
17. See Thier, Herbert D., et al., "Intentionality and Action: A Survey of Mexico City Schoolteachers' Perceptions and Expectations Following the September 1985 Earthquake," California Earthquake Education Project, Lawrence Hall of Science, University of California, Berkeley, California, 1986, for analysis of data gathered in a survey of Mexico City teachers regarding their expectations and efforts with respect to earthquake preparedness.