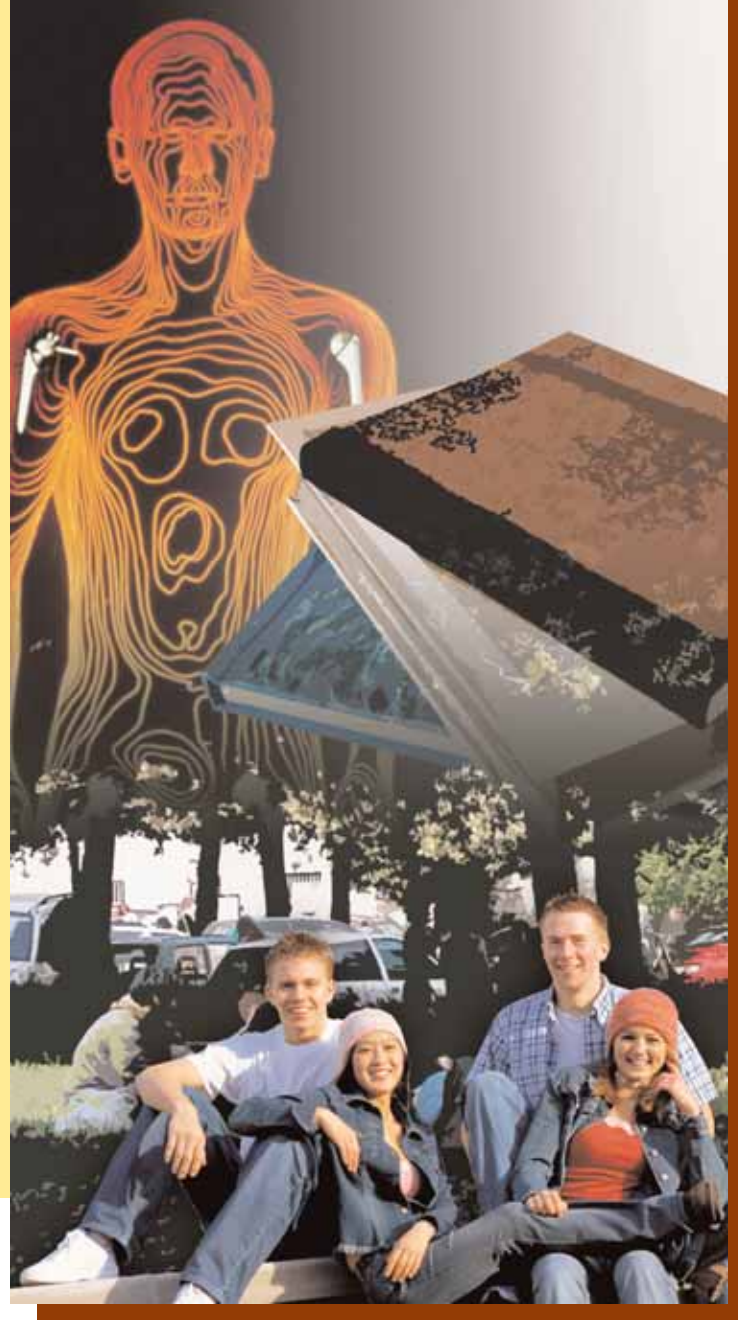


USING BEHAVIORAL RESEARCH TO ASSIST IN THE REDESIGN OF UNIVERSITY PLAZAS

by Daniel J. Amsden

Planners, designers, and decision makers constantly strive to create public gathering spaces within the built environment that respond to people's needs and aesthetic values and help promote social interactions. These plazas are a vital aspect of any university campus and play a valuable role in the overall success of a campus's design. They allow an area for students and faculty to gather, relax, study, reflect, pass time, and interact with the outdoor environment. If planners, designers, and decision makers can understand the interactions between people and these designed spaces, they can effectively create better plazas in the future.

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This article looks specifically at the behavioral research that was conducted at University Union Plaza at California Polytechnic State University (Cal Poly), San Luis Obispo. University Union Plaza is a unique venue for behavioral research because it is a space that is believed by many at Cal Poly to be unattractive and underutilized. As a result, it was determined in the revised campus master plan (California Polytechnic State University 2001) for Cal Poly that the plaza should be dramatically redesigned.

Several authors have shown that design affects the way people use and perceive an outdoor space. Physical elements can affect a user's social interactions, ease of locational transport, and his or her identification of features. The behavioral research used here was designed to gain an understanding of how people react to various design attributes of University Union Plaza and how this affects the way they use the space. This research was designed to complement recent and histor-

ical efforts related not only to university planning, but also to broader topics of public space, environmental behavior and design, environmental psychology, research related to the meaning of space, visual research methods, and spatial geography. A strong relationship between environmental behavior and historical research is essential in planning our built environments in both theory and practice.

Overview of Cal Poly and University Union Plaza

University Union Plaza is the primary outdoor space within Cal Poly's 155-acre campus and is a major destination for students, faculty, staff, and visitors. The plaza has the benefit of being centrally located within the institutional core of the campus and adjacent to a wide variety of uses. It is described in Cal Poly's 2001 master plan as a gateway between the future Centennial Green (another plaza) and the existing performing arts center. The plaza is encompassed by the University Union, a student recreation center, a music center, the campus theater and bookstore, eateries, dormitories, and various physical education classrooms and offices. This study

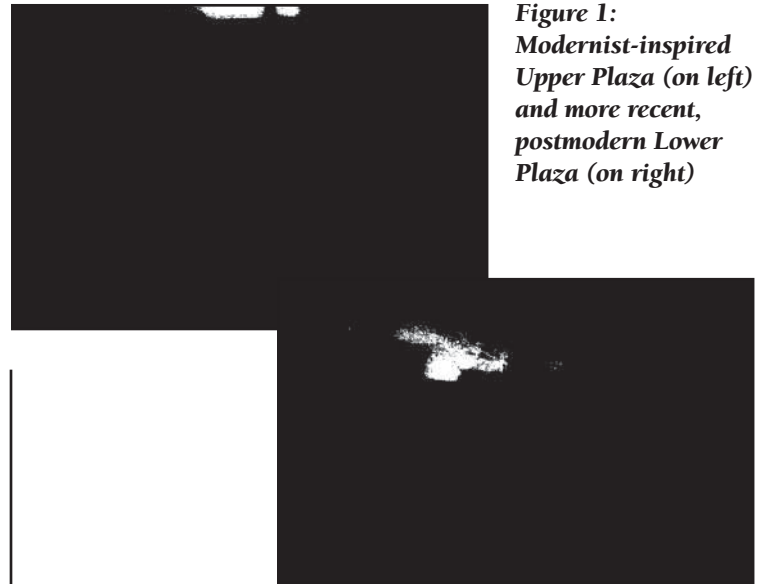


Figure 1:
Modernist-inspired Upper Plaza (on left) and more recent, postmodern Lower Plaza (on right)

incorporating into his design a 5- to 10-foot wall between the plaza and street.

Through the use of site-specific behavioral research, we can gain a greater understanding of how people use public spaces such as plazas.

separated University Union Plaza into two spaces: an upper and a lower plaza (see Figure 1).

Upper plaza. The upper plaza was the main focus of the study and is located adjacent to the University Union. The space was designed by Lawrence Halprin in 1969 and consists of a series of concrete seating structures surrounding a central fountain. It was designed to mirror and complement the modernist style of the University Union building. The design uses concrete as the building material for the seating structures, fountain, and wall. The University Union building also incorporates a similar colored concrete into its facade on the walls facing the plaza.

The surface of the plaza was originally designed to have brick and concrete sections that radiate out from the central fountain. As a result of budget cuts at the time, the portions of the surface that were supposed to be brick were instead filled with asphalt. As a result, the asphalt's dark surface does not blend with its surroundings (see Figure 2).

Probably the most noticeable design feature of the plaza is the concrete seating structures that frame the sides of the plaza. They serve various functions, from providing seating and gathering areas to creating a definable edge for the space (see Figure 2). The upper plaza was also designed to be a separate space from an adjacent streetscape. Halprin did this by

Lower plaza. The lower area was designed more recently and serves as a connector between the upper plaza and the center of the campus. The lower plaza has a different feel than the upper area and exhibits postmodern design with its strong connection to adjacent buildings and a pedestrian-friendly atmosphere. The plaza is easy to navigate because of

Figure 2:
View of the Upper Plaza from the University Union's balcony. Note the asphalt surfaces and concrete seating structures.

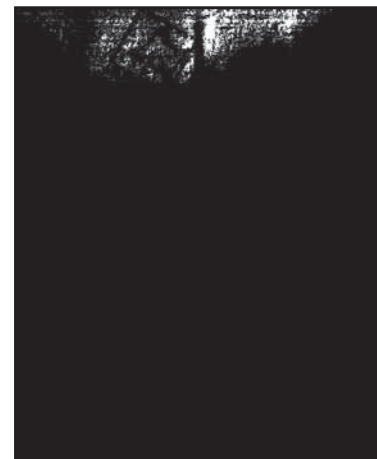
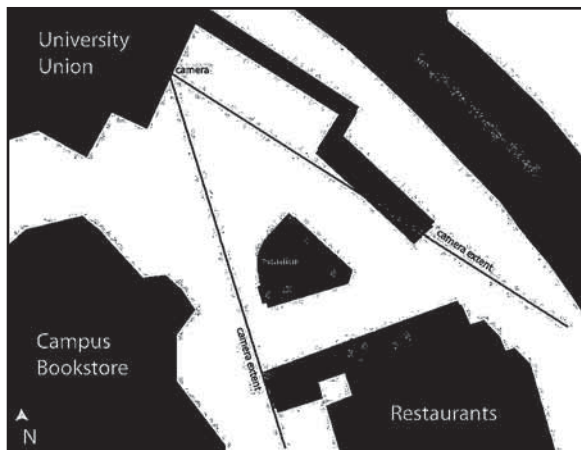


Figure 3: Results of Tape A

Note: X=people sitting together; •=people sitting alone.



the use of planters and other objects as borders and focal points.

Research Method and Assumptions

The hypothesis for this research assumes that a direct correlation exists between the physical design of University Union Plaza and how people were using the space. The first research technique used was to create behavioral maps from video recordings of people using the plaza. The video was shot at peak times and sped up to illustrate trends of where people were sitting, their paths through the plaza, and their activities. This allowed us to gather objective data because there was no contact with people in the plaza.

The second research technique was to ask participants to create a cognitive map of what they believed were the major features of the plaza, how they used the space, and what they liked or disliked about the plaza's design. We gave participants blank maps to draw and write on and asked them various questions related to the plaza's design. This technique enabled us to acquire subjective data, because we directly interviewed the users regarding how functional the plaza was to their needs.

Behavioral Mapping Research

Behavioral mapping is a technique that is widely used to study people's locations and actions within a given physical environment (Sommer and Sommer 1997). Information about movement patterns is typically obtained by tracking people, either on-site or through the use of film analysis (Madden and Love 1982). For this research, we positioned stationary video cameras on a balcony overlooking the plaza on three separate days. The cameras were left to record 60 minutes of continuous footage, filming the various activities people were engaging in at the plaza (known as tapes A, B, and C). Classes at Cal Poly are typically an hour long, and buses are scheduled at 60-minute intervals. This allowed the cameras to record two bus pickup/drop-off times where key circulation and gathering characteristics could be observed. We also

videotaped during peak hours (typically between noon and 1:00 p.m.) to witness the greatest amount of activities within a 60-minute interval.

After the video footage was shot, the tapes were time-lapsed to better identify trends in the location and activities of the users. We then compiled this data into various place-centered maps (Sommer and Sommer 1997) to show where people were located and the behaviors they were exhibiting. The objective was to understand how people were using the space and how the design of the space encouraged or discouraged various activities.

Tape A. Tape A was shot facing south from the University Union balcony. Figure 3 shows the camera's angle and where people were seated in the plaza and whether they were in groups or sitting alone.

Tape A showed that people mainly choose to sit on the concrete seating structures next to the fountain and on the south side of the plaza. They were all sitting in the sun and facing the main circulation paths through the plaza. For the most part, people were socializing and studying.

The video also showed some interesting circulation characteristics about the plaza. By speeding up the tape, we were able to see that a significant number of individuals who were leaving the bookstore and heading to the bus stop had to maneuver awkwardly around the fountain. This was interesting to observe and clearly showed that the fountain was an obstacle in their path.

Tape B. Tape B was shot facing east from the University Union balcony above the bookstore (see Figure 4). Similarly to tape A, it showed that groups and individuals were inter-mixed within the plaza. One difference was the large number of groups located around the fountain. This particular day was during the university's rush week, and there were many fraternity/sorority booths on display near the fountain.

This video also showed that people had to navigate around the fountain to reach their destination. This is not necessarily

**Figure 4:
Results of Tape B**

Note: X=people sitting together; •=people sitting alone.

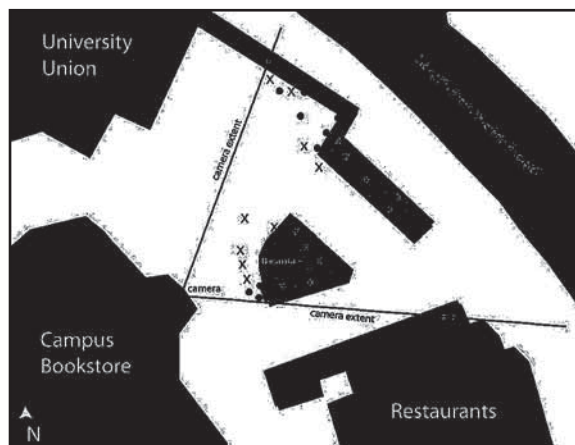
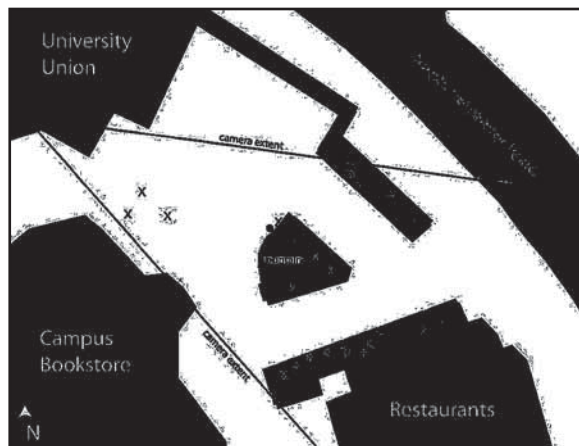


Figure 5:
Results of Tape C

Note: X=people sitting together; •=people sitting alone.



negative, but it does show the importance of the fountain as a design feature within the plaza. This view showed quite well the separation caused by the wall between the plaza and Perimeter Road. The camera angle also showed that the tables located in front of the University Union building were cut off from the rest of the plaza and the main pedestrian flow.

Tape C. Tape C was shot facing south from the portion of the University Union balcony located at the top of the main stairway (see Figure 5). Similarly to the first two tapes, it demonstrated that there was a wide disbursement of groups and individuals throughout the plaza. This angle also allows one to observe the entrance area to the University Union building and the bookstore where a large amount of social interaction occurs. This was interesting because the location is in the middle of the main footpath between the plaza and the University Union building. The tape also allowed for the best view of the circulation issues within the plaza and showed that the fountain presents an obstacle to people who are trying to get through the plaza.

Circulation patterns. Figure 6 shows the circulation patterns observed in the plaza and is a collection of what was observed from the three tapes. Users tended to follow pathways that were either close to buildings or in a direct line to their target. Users often passed close to the fountain in order to maneuver around it in a timely manner. There were significantly more people trying to get through the plaza than people who were staying and enjoying the space. This is most likely a result of the plaza's being a connection between various areas of the campus.

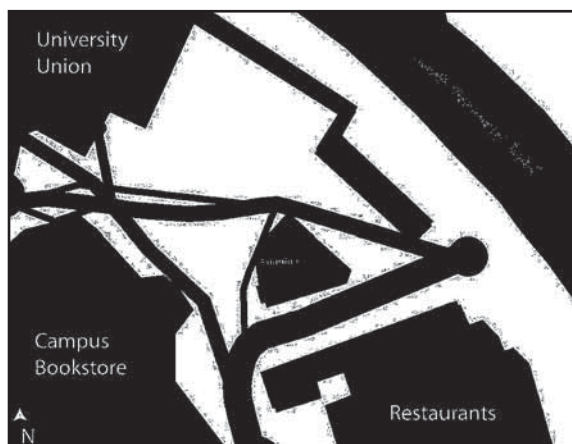
Cognitive Mapping Research

Cognitive maps are mental representations of a particular environment with which people are familiar. The term was first introduced by psychologist E.C. Tolman (1948) to explain how rats remembered the location of prizes within a maze. Tolman found that rats did not have a complete mental picture of the maze: They only remembered information that

was important in order for them to reach their reward. Tolman hypothesized that organisms tend to remember spatial traits that are relevant to a particular goal. Downs and Stea (1977) described this process as a series of psychological transformations by which an individual will acquire, code, recall, and decode information about the relative locations and attributes of phenomena in his or her everyday environment.

One of the most common cognitive mapping methods is to ask a participant to draw a map of a particular area he or she has visited. The assumption is that subconsciously people will draw features on the map that are important to them and omit features that are less important or less obvious. For this reason, cognitive maps can be quite different from the actual places they are supposed to represent (Sommer and Sommer 1997). This method allows researchers to get inside the

Figure 6:
Circulation Patterns Observed During Behavioral Research
Note: Larger lines indicate heavier traffic.



participants' heads and see how they visualize the place in question.

The cognitive mapping and survey portion of this research was designed to bring people into the planning and design process. It provides an opportunity to understand how people are using University Union Plaza and which aspects of its design are relevant and important to their needs.

These visual self-reports are limited by the assumption that only the information provided in the report has some significance to the respondent (Sanoff 1991). This particular research method is also limited by the fact that the participants' cognitive maps will be influenced and distorted by their background, experiences, purposes, and so on (Zeisel 1984). The benefit to researchers of public spaces is that through the use of this technique, they can determine which aspects of the physical environment are important to various users and which are not. In turn, they can use this information to help plan and design places that are more comprehensible to people (Zeisel 1984) and better serve their needs.

Figure 7: Survey Groups

Planning Students:	n=20
Users:	n=11
Type:	Architecture or City and Regional Planning
Students Number	20
Type:	
Freshman	3
Sophomore	3
Junior	1
Senior	2
Graduate	1
Faculty Number	1

Survey design. We administered the cognitive mapping and survey portion of the research to two groups: one group consisted of city and regional planning and architecture graduate students, hereinafter referred to as planning students; and the other included students and faculty members who were approached at the plaza, hereinafter referred to as users (see Figure 7).

The survey included the following six questions relating to various activities people participate in while at the plaza and their personal impression of the plaza's design:

- Question 1 asked participants to draw a cognitive map describing features of the plaza that were important to them relative to how they used the space. For this they were given a site plan of University Union Plaza (see Figure 8) showing only major streets and the footprints of buildings. The question asked participants to draw in key features of the plaza they believed were interesting or had some significance to them. They were also allowed to describe in pictures or words any attribute of the plaza or surrounding buildings.
- Question 2 asked participants to state whether they were students, faculty, staff, or visitors.
- Question 3 asked participants how often they visited University Union Plaza.
- Question 4 asked participants in which kinds of activities they participated.
- Question 5 was more direct and asked participants to describe which features of the plaza they liked and disliked.
- Question 6 asked participants what they would change and why if they could redesign any feature of the plaza.

Administering the surveys. The first group we surveyed was the planning students group. We approached them during one of their classes and gave a brief description of the research. We then gave the survey to the participants, who took as much time as they needed to complete it. There were

two benefits to administering the survey to the planning students. First, it was assumed that the students already had some knowledge of the theories related to urban design. This allowed them to analyze the space more objectively considering their background. Second, when we surveyed this group, they were not actually in University Union Plaza but were in a classroom on the other side of the campus. This was particularly beneficial to the cognitive mapping question because it forced them to rely on their memory of the plaza.

The second group we surveyed was the users group, which consisted of people who were approached while they were in the plaza. Users who filled out surveys included undergraduate and graduate students and one faculty member. They were given as much time as needed to complete their surveys. To remain impartial and not skew the results, we, as survey administrators, were not allowed to answer any questions about the plaza or its design.

Planning students survey results. The features that stood out most in the cognitive maps done by the planning students were the fountain, main seating areas (concrete, step-like seating structures), the large wall between the plaza and Perimeter Road (see Figure 9), and the entrances to the buildings. The respondents seemed to feel that these features were negative in either their design or functionality. The planning students mentioned positive features of the plaza, including the entrance of a newer building to the south, the built-in

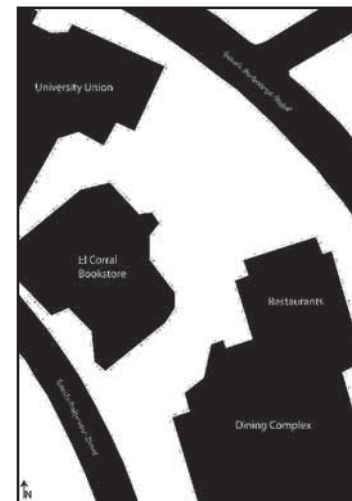


Figure 8:
Example of Template Used for Cognitive Mapping Research

concert stage, tables located in the lower plaza, and a large tree in the center of the lower plaza.

A majority of the planning students stated that they only visited the plaza on rare occasions and their activities usually entailed walking through the plaza to get to some other destination. Some noted that they went to the plaza on a regular basis (i.e., one to three times a week, every day). However, their responses showed that they did not use the space as much as the undergraduate students of the user group.



Figure 9:
View from the street of the University Union Building and the Upper Plaza (on the left); reverse view back to the street (on the right). Note the large wall separating the two spaces.

Responses to the fourth question showed that walking through the plaza was the main activity that the planning students performed within the space. The utilitarian activity of buying textbooks at the El Corral Bookstore also received a significant number of responses.

Responses to question 5 provided detailed information on the planning students' views of the current design of the plaza. The results were straightforward, and the overall direction of their answers was related to the plaza's aesthetics and circulation pattern. They liked the sociability of the plaza and its adjacent uses and seemed to dislike the large amount of concrete used in the plaza, the fountain, and the seating structures.

The three most notable recommendations from the planning students were to 1) create a more natural landscaping with trees and grass, 2) design a working and aesthetically pleasing fountain as a focal point for the plaza, and 3) provide more mobile seating with tables. The students also brought up issues of poor access, lack of a sense of place, and the creation of a better stage.

User survey results. The users described features of the plaza in their cognitive maps that were similar to the planning students group. This included the prominence of the fountain and main seating structures. One difference was that the users had a favorable opinion regarding the functionality and overall design of the fountain. They generally liked the layout of the

seating structures and the fact that they could "people watch" while they were sitting.

The only negative remarks made by the users on their cognitive maps were in respect to the tables located near the large wall that separates the plaza from Perimeter Road (see Figure 9). They did not like the fact that the tables had no shade and were isolated from the rest of the plaza. These remarks were similar to those given by the planning students and suggest that participants in this research had an overall negative view toward the wall that separates University Union Plaza from Perimeter Road.

The users tended to spend more time in the plaza than the planning students, as evidenced by their answers to question 3. A majority stated that they visited the plaza on a daily basis for various activities, such as studying and visiting with friends. The users also had significantly different answers than the planning students did to question 5.

The users seemed to like the seating areas. The planning students seemed to dislike particular design elements of the plaza, whereas the users disliked the lack of functionality of the space (such as their ease of movement through the plaza). Redesign suggestions provided by the users were similar to those given by the planning students. These included the creation of a working fountain, more shade trees and natural landscaping, less use of concrete, and more functional

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features (such as tables, a visible clock, and a better connection with the street).

Conclusions

The goal of this research was to understand how people react to the design characteristics of University Union Plaza at Cal Poly and how this affects the way they use the space. The hypothesis was that there is a direct correlation between the physical design of University Union Plaza and how people were using the plaza. The research presented here used behavioral and cognitive mapping in an attempt to justify this correlation.

The behavioral mapping portion of the research justified the assumptions of the hypothesis by showing that a pattern existed between the designs of the plaza and how people were using the space. The research showed that various elements of the plaza's design affected the way people moved through the space and in which activities they participated.

The cognitive mapping research method was able to extract a large amount of information from the participants related to how they used the space and what their opinions were regarding its design. The cognitive mapping technique was also valuable because it allowed for participants to be subjective in their answers.

This research has shown that through the use of site-specific behavioral research, we can gain a greater understanding of how people use public spaces such as plazas. This particular approach was unique because it looked at an existing plaza that is scheduled to be redesigned within the 2001 revised campus master plan. Although this plaza has been underutilized for many years, the research has proven that there are some positive qualities to its design that should be taken into consideration within its redesign process.

This method was useful as a means of determining which design features should be utilized in the new plaza. It also proved to be an effective way for Cal Poly planners to analyze the plaza's existing design and determine justifiable recommendations for its redesign. This technique can be beneficial to planners and designers at other university campuses who are interested in redesigning plazas and communal areas within our built environment that respond to people's needs and aesthetic values and help promote social interactions. 🏛️

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