

# Facilities Design

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Appendices are available through the WASC Coordinating Office

*For questions regarding the WASC Self Study contact the [WASC Coordinating Office](#).*

## Statement of Questions Addressed

The WASC Facility Design Subcommittee presents this report on their research and activities during the 1998/1999 academic year.

Two researchable questions were developed from the self-study proposal.

1. To what extent do the facilities at Cal Poly support current and future learning and how can they be improved?
2. To what extent does the activity of providing facilities at Cal Poly support current and future learning and how can it be improved?

After an examination of all the different environments at Cal Poly in which learning takes place, two types of learning environments were chosen as focus areas for research and exploration.

1. Instructional Space Research – This portion of the committee’s work focused on the evaluation of existing space with recommendations for new space following naturally from the evaluations.
2. Information Resource Space Case Study – Here the focus is a vision of the future using a currently proposed project as a case study.

Sample survey instruments, raw data, background information, and other committee documents are included in a binder at the WASC office. The digital database developed from the research is in-use and located and maintained by Facilities Planning.

This WASC self study provided the forum for useful dialogue on many current Cal Poly programs including:

- The [Cal Poly Master Plan](#), a comprehensive plan for the physical future of the Cal Poly campus.

- The Deans' Enrollment Planning Advisory Committee work on Enrollment Scenarios for the Master Plan.
- Current programming of major capital projects such as the Engineering / Architecture Replacement and Renovation Phase I & II.
- An anticipated telecommunications infrastructure upgrade project.
- A campus-wide energy use analysis and retrofit.

Many of the subcommittee members are involved in these other efforts and their participation in the WASC Facilities Subcommittee sparked valuable synergy.

We consider this report a snapshot of current progress. All the efforts portrayed here are in-progress and will move ahead beyond the confines of this current WASC self study.

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## Methodology

### Research, Instructional Space

To assess the quality and effectiveness of the instructional spaces on campus, our committee progressed through six stages of review and analysis:

1. Define Instructional Space
2. Establish Criteria
3. Physical Survey
4. Department Head/User Group Survey
5. Student Outreach
6. Product Review and Refinement

**Define Instructional Space:** To define the instructional space, we reviewed all the places in which instruction occurs: lab, classroom, lecture hall, but also orchard, ball field, office, coffee shop, work place, residence hall, or quiet place under a tree. For the purposes of this task force, we narrowed our definition to *spaces to which students are assigned for university classes*. Coordinating the Facilities database with the university scheduling office, we developed a working list of 840 rooms, which included lab, lecture and seminar rooms and their associated support spaces.

**Establish Criteria:** To establish criteria for review, we participated in brief workshops affectionately dubbed *The Ideal Classroom Exercise*. First, as homework, we each completed a written survey to examine teaching methods, student-teacher and student-student interactions, physical environment, and varied uses of a space. Based on the surveys, we developed four general categories: Furnishings, Technology, Configuration, and Environment. Together, with an

outside facilitator, we then brainstormed about what physical components make up the "Ideal Classroom." Through the list, we discovered some over-arching principles that reached across the individual items:

- Total Control of Environment
- Flexibility
- Life-Cycle Costing
- Security
- Universal Access

The physical components of "Flexibility," for example, could include movable desks, variable lighting, Internet access and multiple chalk or dry-erase boards. Next, we cast our votes for which components were the highest priorities, or which we did not even want, by placing a set number of dot stickers by the selected items – green for high priority, red for undesirable. Through our discussions and our observations of the visual mixture of red and green on some items, we determined that there is no single Ideal Classroom. What works for a music room does not necessarily work for the large lecture hall or the chemistry lab. While we hoped to find physical components that were universally desirable to use as our criteria, we acknowledged the need to review the process and product of design to address the needs of individual instructional spaces.

There were two more steps in the Ideal Classroom Exercise. We each took home a disposable camera for two weeks to photograph good and bad examples of our desired components and configurations. The results were used to define further our ideals, such as a "comfortable" chair, or "excellent" lighting. The final step was to draw room plans for three ideal lecture-type classrooms, small, medium and large. We showed desks, doors, projection equipment, windows, clocks, storage and other components. We gave ourselves the one constraint of fitting within the State allowances for area-per-student. We found this constraint limiting and frustrating, especially in the smaller seminar-type room.

**Physical Survey:** We determined the need to assess physically each instructional space. Based on the input of the Ideal Classroom Exercise, we developed a checklist for reviewing and assessing each room. The form included:

- a checklist of amenities, such as TV/VCR and storage
- a list of the furnishings with relative sizes
- an assessment of the condition of the physical space (floors, walls, ceilings)
- an assessment of the physical attributes of the room, such as acoustics, lighting, current technology and access

During the winter break, a team of five surveyors went through every room on our list. We completed the checklist, measured the rooms (to compare with the Facilities database), took a photograph of each wall, and marked the floor plans with outlets and specific furnishings. For quality control, we developed grading guidelines and had the Project Manager (a WASC

committee member) view every room with the surveyor.

Although we visited every room, we did not evaluate support spaces separately. For instance, Laboratory 101 was evaluated with consideration for the storage and equipment in Prep Room 101-A; Prep Room 101-A did not have a separate evaluation. The number of actual evaluations, then, dropped from 840 to 670.

**Department Head/User Group Survey:** The second half of our evaluation of each space was a questionnaire to the User Groups. Although our physical survey provided a consistent foundation for comparing each room to each other, the survey team could not fully assess certain qualities, such as the adaptability of the room to various functions, or the acoustics when occupied. For this purpose, we distributed a questionnaire to the head of each department. We posed general questions regarding the future direction of the department or college and top priorities, and specific questions regarding the individual spaces assigned to that department. Of the 67 questionnaires distributed, 50 were completed and returned.

The results of the Physical Survey and the Department Head Survey are discussed below in "Condition of Existing Instructional Spaces."

**Student Outreach:** Although we encouraged the Department Heads to solicit student input, we also wanted to solicit direct student input. For this, we attended the student council meeting for each of the colleges, six meetings in all. We made a brief presentation of the goals of the project and the WASC accreditation process. We then conducted an exercise similar to one of the Ideal Classroom exercises in which students create a list of classroom components and place dots by the highest-priority items. The information was then incorporated into our final analysis and recommendations.

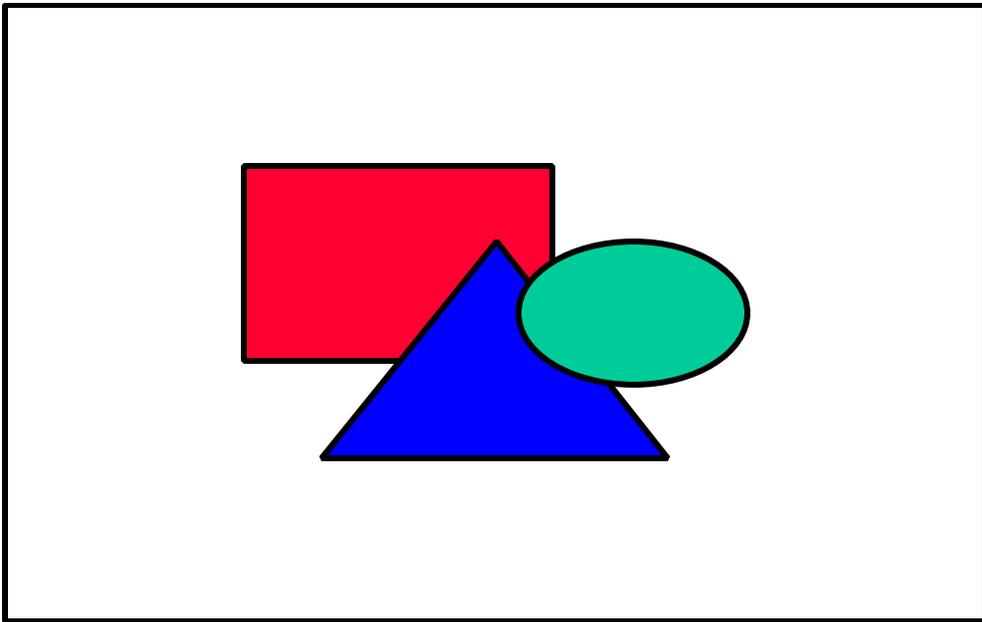
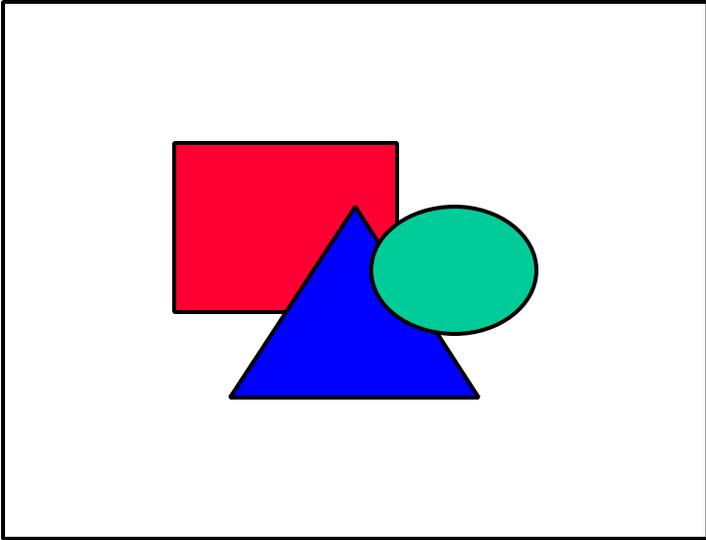
**Product Review and Refinement:** Throughout data collection, the committee continually monitored the process and results, both for accuracy and completeness. In addition, we sought to identify possible implications that could warrant additional research or investigation.

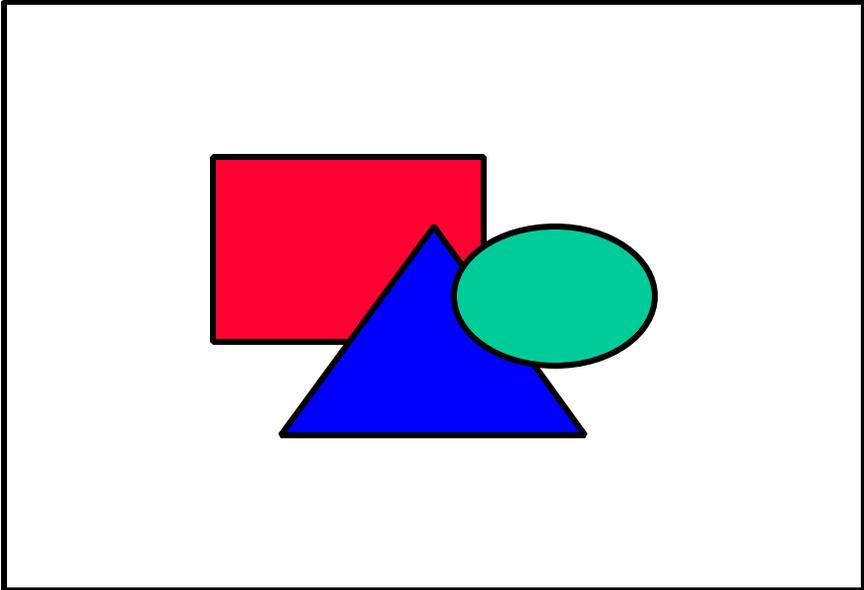
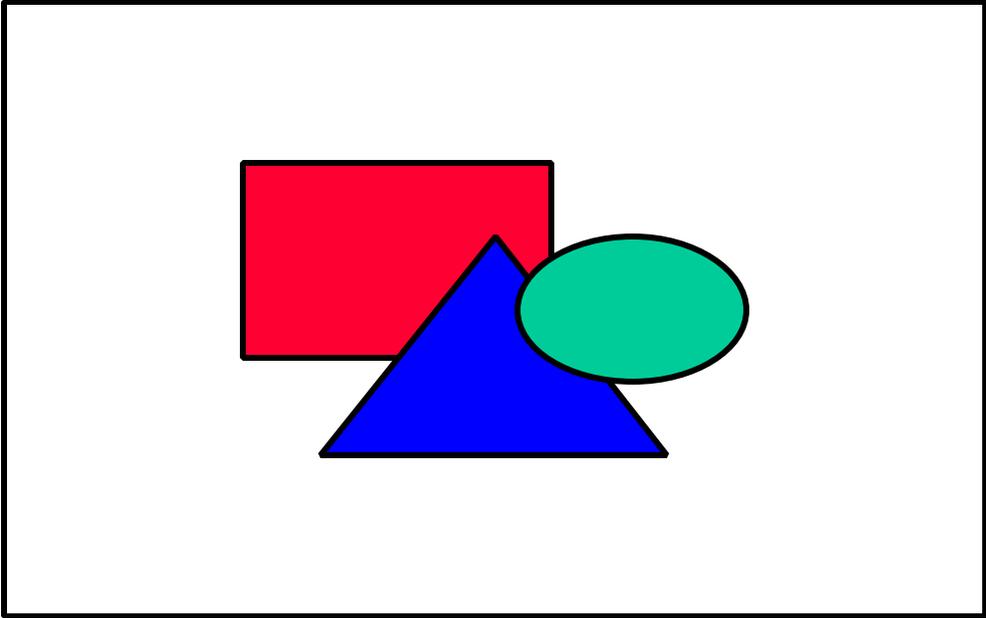
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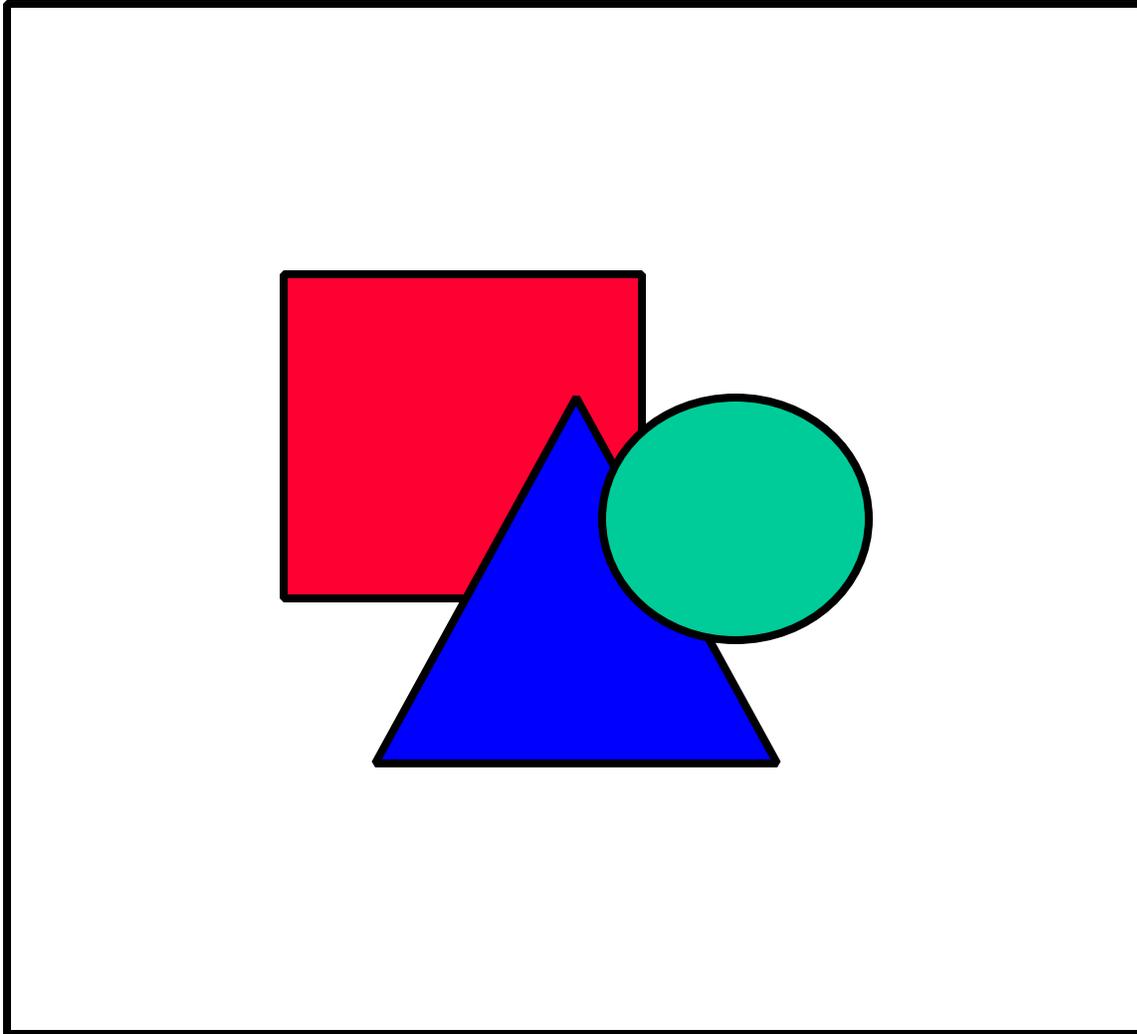
## Findings, Interpretations, and Analysis

### Condition of Existing Instructional Spaces

**Physical:** The summary result of the physical survey is that, in general, the spaces are in good condition. Ranking items 1-5, 5 for the best, 1 for the worst, 76% of rooms were ranked either 4 or 5 in the "Overall" category. The following graphs display the results of the physical survey.







From these graphs, we observe several items of particular interest. In "Walls, Floor, Ceiling & Overall Condition," we see there are very few physical qualities that are in poor or worst condition.

In fact, the average is about 4.0 for each of those categories, indicating that there are not *significant* deferred maintenance items (i.e., holes in walls or ceilings, missing tiles, and so on). In

"Lighting and Fenestration" we see a little more variability. While artificial lighting followed the typical pattern of the "overall" category, the average rank for *natural* light was 3.2, and there were many rooms (24%) that had no natural light at all. Ability to blackout a room through window coverings was again variable, with almost 20% of rooms ranking in the poor or worst category.

"Door Access" was based on the ideal of 2 doors to every room, to facilitate student movement between classes. Generally, door access was good.

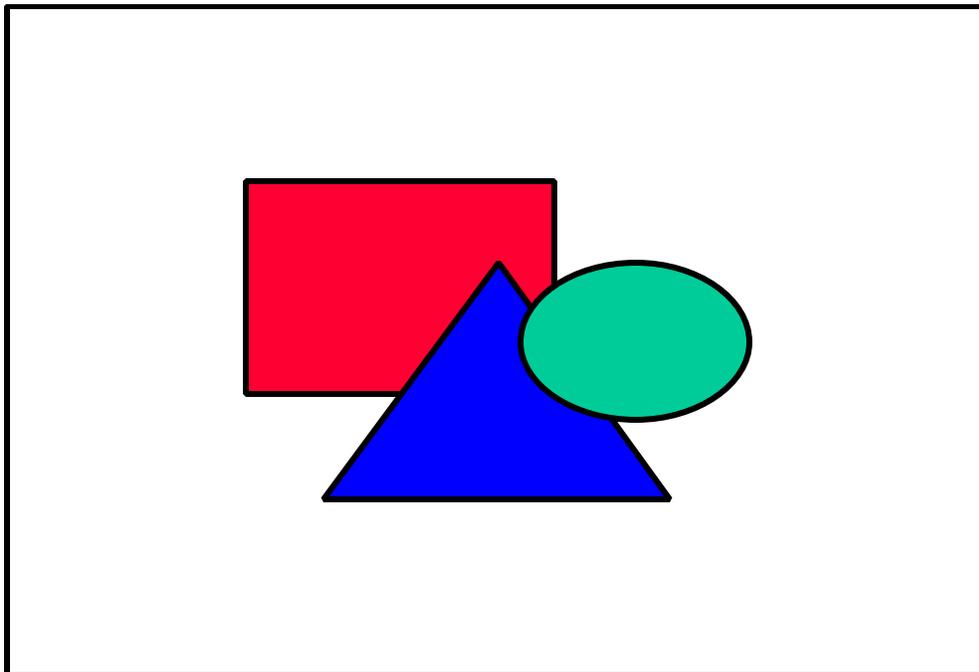
Under "Qualities," sight lines were generally excellent, and acoustics were good. Environmental control, however, that allows an instructor to control the temperature of a room, was generally fair or poor. Thermostats or fans typically could not be adjusted, and, in rooms that had windows,

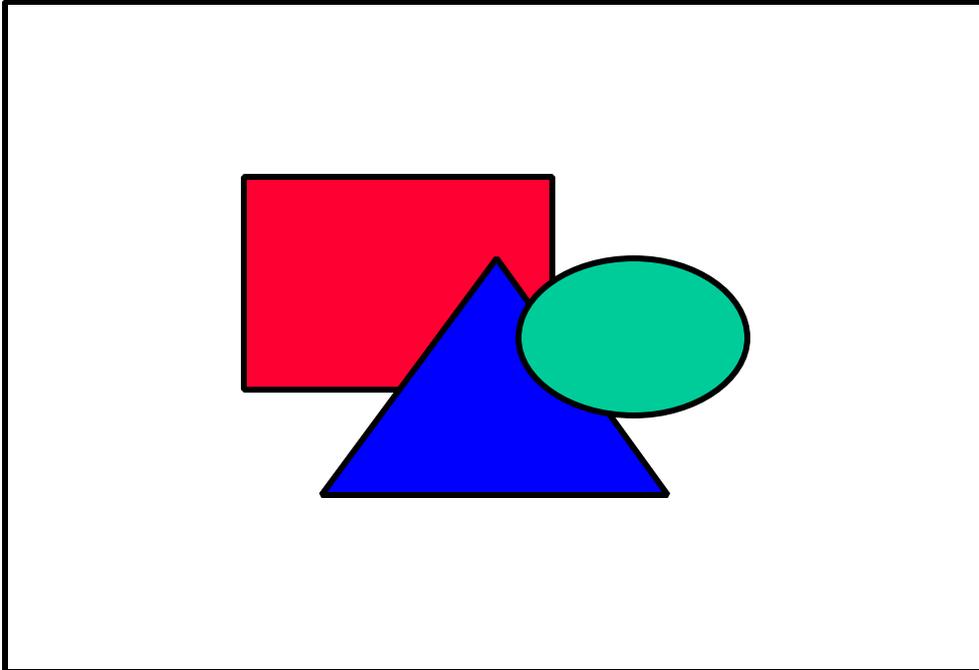
fewer than two-thirds were operable. Outside noise was typically good or best, but that was a difficult category to rank when classes were not in session.

Rooms were not typically as flexible as they could be, most notably in labs that had fixed stations. On the other hand, most spaces appeared to be quite usable for the apparent function, meaning that the workspaces had sufficient lay-out area, access, teaching space, and so on. Technology, however, was a mix, with a pretty even spread between fair, good, and excellent. Most rooms (70%) had an Internet connection, while only 40% had computers, many of which are obsolete. Still, 24% of the rooms earned the "best" ranking in technology, evidence of the many remodels and upgrades that have been accomplished.

Aside from the technology items listed above, the "Amenities" checklist is more useful when its items are compared to the individual types of spaces, rather than to all of the rooms universally. Many rooms, for instance, do not require a TV/VCR or a lectern. Of note, however, is the low number of occupancy sensors, which is an environmental issue, and the relatively low number of window coverings, contributing to the low ranking in "Blackout" as noted above.

**General Information from Survey:** The database itself, regardless of our surveys, provided access to other kinds of analysis, such as distribution of space. The following two graphs indicate the distribution, in terms of area, between types of instructional space (lab vs. lecture) and between the colleges.

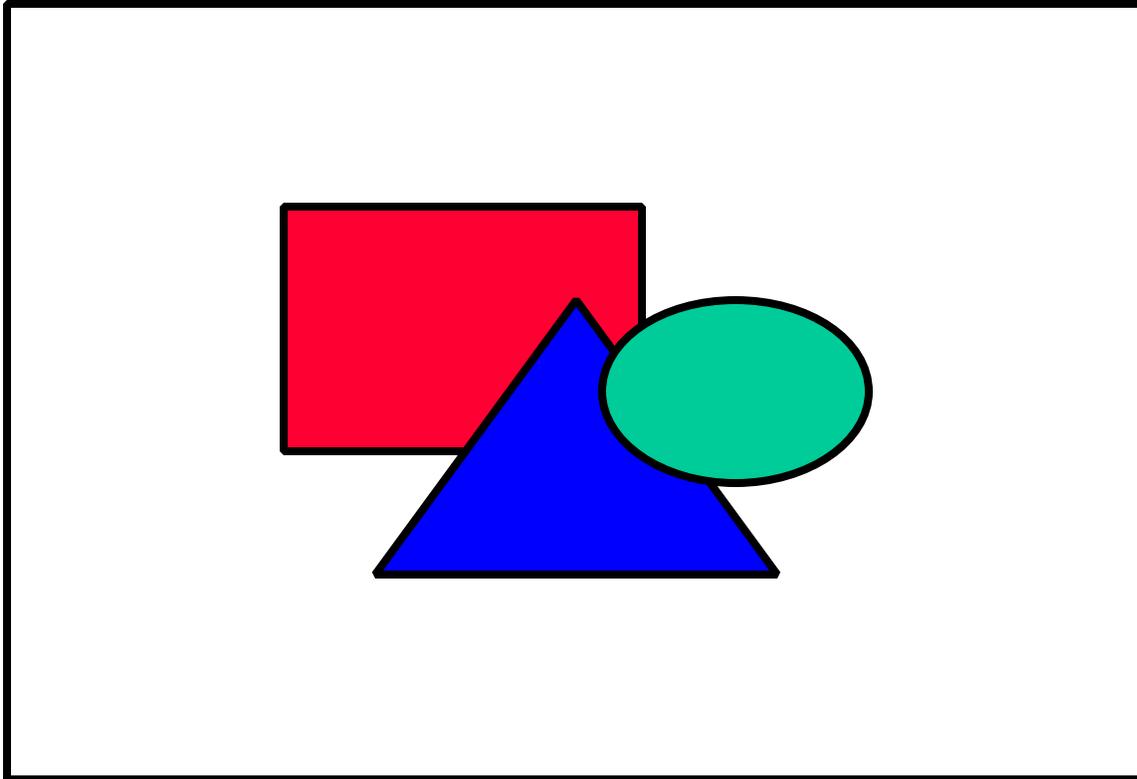




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## Discussion, Recommendations, and Conclusions

**Department Head Response:** Coming on the heels of our physical survey, the results of the Department Head questionnaire provided a great deal of additional information, especially since many of the results seem in direct conflict with our physical assessment. In brief summary, we can say that user groups do not feel as positively about their spaces as the physical survey team did. Comparing results, our committee was able to identify new issues and confirm other principles. Comments specific to each room were supplemented by general comments about spaces throughout their departments and on campus overall. The following table summarizes the room-specific comments that were numeric.



In the "Remodel" category, it is important to note that the question asks, "Do you feel this room is a good candidate for remodel or renovation? (5=Excellent Candidate)." The higher ranking reflects a keen interest in renovation or remodel; over 45% ranked their space as a good or excellent candidate. Other important factors include the very low numbers of spaces that received a "best" ranking in Configuration, Technology, and the ability to meet that department's Future Needs.

A review of the general comments provided greater insight into the priorities of the user groups, and revealed some frustration with "the system." There were several remarks about lack of cleanliness, broken furniture, broken or maladjusted window coverings, or poor temperature control. The comments that seemed to draw the most passion were safety issues, from ventilation of toxic material to exposed power cords. The need for flexibility and variety was reinforced, as some instructors requested more small meeting room, while others requested more large lecture spaces. Matching classroom technology with that available in the industry was also a common theme; even the newer computer labs had requests for updated software or services. There were several requests for more storage space, from personal lockers to outdoor yard space.

## **How Facilities Support Learning**

Our committee's charge, in part, was to answer the research question, "To what extent does the physical environment support learning and the academic mission?" Although we can certainly identify areas for improvement, our research indicates

that the instructional spaces support learning reasonably well. The rooms are typically in good condition. With only a few exceptions, user groups did not typically list the need for *more* space as a high priority, indicating that the quantity of instructional spaces is basically sufficient. In comparing existing spaces to our "ideal" classroom, we found that many of the qualities are in place, such as Internet connections, movable furniture, and zoned lighting. The integration of newer technology is apparent in many rooms scattered throughout campus, with advanced computer facilities and multi-media presentation rooms. New construction on campus, such as the Business building, elicited only a few minor complaints, indicating that the process for design and construction can work well.

The research also shows areas of weakness in which instructional spaces need to do more to support learning. Lack of maintenance or repair appears to be particularly disruptive to the learning environment, since the issue generates frustration from the user group. Continuing to integrate technology and respond to changes in the parallel industry are also high priorities. There is a need for greater flexibility and varied learning environments. Although there may be some opportunity for greater efficiency in existing spaces, some disciplines seem to need more space to support their programs, such as design labs, independent engineering research, and some of the smaller liberal arts programs. Some of the buildings that are less than 20 years old, such as the Architecture building, are in worse condition than even older buildings, indicating some flaws in the process that need to be addressed.

## Guiding Principles for Successful Instructional Spaces

Based on our research, we developed several principles that contribute to creating instructional space that truly supports learning. The principles can be applied to any type of instructional spaces. Examples of implementation demonstrate how the principle could be applied.

Principle	Examples of Implementation
Instructional spaces shall be flexible, to accommodate a variety of different teaching methods	-Movable furniture -Partitions can be removed easily for remodeling -Compact presentation equipment
Safety and security of faculty, staff and students shall be a high priority	-Safely vent toxic fumes -Special attention to security for evening and 24-hour labs, such as lighting and visible lines of sites
Spaces and furnishings shall be ergonomically designed for comfort and health	-Comfortable chairs of adequate size -Easy-to-use boards and presentation equipment

Instructional spaces shall be universally accessible	-Include equivalent wheelchair access for students and instructors -Consider the needs of low-vision and hearing-impaired students and instructors
User groups shall be able to control their environment, including natural and artificial light, fresh air, heating, and ventilation	-Thermostats in each room -Excellent window coverings -Dimmers on lights -Operable windows
Sufficient storage shall be provided to accomplish the program mission	-Storage for student projects -Storage for instructional equipment and supplies
Technology in instructional spaces shall be current, well-maintained and support varied teaching methods	-Multi-media equipment provided in most lecture and lab spaces -Multiple data ports in labs for laptops
Sight lines and acoustics shall be excellent in instructional spaces	-Consider site lines to projection surfaces, to instructor, and to other students
A variety of sizes and amenities shall be provided for instructional spaces	-Small seminar rooms to large lecture halls -Labs with curricula-specific labs and equipment
Instructional Spaces shall be well maintained	-Clean -Fresh paint -Floors and ceilings in good condition

Application of the principles is discussed below.

## Process for Creating and Renovating Spaces

We recognized that some of the weaknesses in existing spaces have less to do with the physical rooms, and more to do with the processes of design and construction. With that in mind, we developed a second set of principles, listed below, which address the *process* for creating spaces, whether a new building or small renovation. Again, examples demonstrate possibilities for implementation.

Principle	Examples of Implementation
Communication shall be consistent and open throughout the life of a project	-Include open forums for preliminary project selection -Maintain public websites through design and construction
The needs of user groups shall be solicited and considered for inclusion in project program	-Involve users in the early programming efforts -Continue to include users through design and in essential decisions during construction
Project costs shall be carefully monitored throughout design to avoid last-minute detrimental cost-cutting decisions	-Utilize professional cost estimating services -Require cost estimates at specific design milestones

Environmental sustainability shall be considered for any construction project

- Design for long-term energy efficiency
- Consider life-cycle costs for building maintenance and operations
- Consider circulation patterns and the project's contribution to sustainable transportation

In examining the building process, we entered the numeric world of the California State University System, and the accompanying limitations. The formulas for allocation of space seem insufficient and inflexible. If a department can raise private funds to construct more space, they are actually "penalized," in that the State will not permit them to have more space than the allowance. If they do construct new instructional space, other space would actually be taken away.

The actual funding is also a source of frustration, especially in terms of life-cycle costing. A project budget, determined by strict formula, currently cannot be increased to compensate for a life-cycle cost decision. For instance, a higher quality roof product, which may cost a little more now but save thousands over the building life, may not fit into the construction budget, and the maintenance budget cannot be shifted. For the same reasons, the funding issue is especially detrimental to decisions concerning environmental sustainability and energy efficiency.

There are also considerations for new space compared to remodeling existing space, such as:

- There are limitations in remodeling regarding the ability to modify infrastructure and density, etc.
- There are qualities that are uniquely possible in new spaces, such as a greater integration of technology and "built-in" ability to renovate and update in the future

We are investigating systems to incorporate the Design Principles into the Cal Poly System, such as

- Incorporation into Campus Standards document
- Distribution to Design Team and User Groups

In addition, we will be initiating a review of the system by which maintenance items are reported and addressed. Issues included

- Communication with individual and department initiating complaint
- Clarification of funding, i.e., which items are the responsibility of the University and which are the responsibility of the individual college or department
- Scheduling of items that are not currently funded or cannot be immediately addressed; communication of such schedule with the user group.

## Closing

Instructional space at Cal Poly is certainly adequate to serve its purpose. There are many more examples of excellence than failure. Recently completed projects have improved the quality of instructional space. Projects in the planning phase will certainly benefit from this self-study.

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