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POTENTIAL AUTHORS: JAE is a refereed journal which addresses significant questions in architectural thought and practice and reaches all members of the architectural academic community. Its aim is to examine all institutions which have impact on the many facets of architecture. In this light, JAE encourages prospective authors to view their writing as an exercise in critical inquiry.

Articles should be submitted in triplicate to the JAE Executive Editor (address below). Upon submission, the Editor will send copies of the article.
Private Reactions to Public Criticism
Students, Faculty, and Practicing Architec
State Their Views on Design Juries in Archi

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Pomona. A portion of this paper was pre-
sented in a lecture at the ACSA Teachers’
Seminar at the Cranbrook Academy of Art
in June 1985.

This article reports the results of research
about the effectiveness of design juries in
architectural education, a topic which
important is a conspicuous absence of
information from what is our most valu-
able resource: our students. This research
examines the educational value of juries,
both interim and final, how design stu-
dents cope with public criticism, and a
comparison of the architecture student
“subculture” with that of other students.
The study consists of two phases. Phase I
is a case study at a mid-sized university.
This study relied on systematic behavioral
observations, interviews, questionnaires,
and diaries. Students, faculty, and alumni
in architecture, urban planning, land-
scape architecture, and outside environ-
mental design participated in the
research. Phase II is a follow-up study of
other schools, based on questionnaires of
Teachers’ Seminar. Results strikingly
show that the vast majority of all th
questioned—faculty, students, and prac-
ticing architects—believe architecture
juries need improvement. Architect,
students surveyed learn very little from
juries, but learn more from interim to
final juries. Most students respond cel-
sively and nervously to juries, and the
high degree of tension and sheer “b
out” that architecture students expe-
ience greatly interferes with the learn-

process. Finally, this research discov-

that the architecture student “subc
differs substantially from that of oth-
dents, and that it may well be harm-
students’ health. Implications of the
findings are discussed, and suggest...
The purpose of this research was to study systems as a method of architectural education. Although generations of architectural educators have relied on jurors as primary vehicles to evaluate their students' work, very few have taken a serious look at the jury system itself and its inherent value to students in the studio. In this respect, architectural education is almost like a foreign language that must be learned and modified to adapt to the new context of architecture education.

Some assumptions of this paper ought to be pointed out. They center around the notion that the jury is intended to be a learning experience. Ideally, after participating in a jury, students learn how to improve their design concepts. This also improves their ability to evaluate critically the design work. The information gained from each jury experience, ideally, has a cumulative effect so that the design of subsequent work is at least partly influenced and improved as a result of the criticism received on previous design projects. This is the accomplishment of what some scholars have called “double-loop” learning, a deep level of understanding which allows one to reexamine values and assumptions.

Naturally other lessons can be gleaned from the jury experience as well, but these concepts seem to be central. These assumptions form the underlying framework within which most schools of architecture operate. They are reflected in the strong emphasis on design studios (which usually constitute the largest portion of the architecture curriculum), are awarded the highest amount of course credits, and occupy the most space—compared to other classroom facilities—in architecture school buildings and on design juries as a primary way of measuring and evaluating students' progress in design. But are these assumptions really true?

Scholars have virtually ignored the study of design juries. A literature search revealed virtually no empirical research on the educational value of the jury system. Most closely related work, however, includes the research by Hassid, who developed a system for classifying criticism, the two-volume report produced by the Consortium of East Coast Schools of Architecture, and an account of a clinical psychologist who has treated architecture students. However, none of these sources deals directly with juries.

One of the most useful concepts which can be gleaned from the scant literature available was developed by Argyris, who coined the term “Mystery-Mastery” to explain how students are taught about architecture. The notion here is that somehow the critic has mastered the art of design, but the process through which he or she arrives at this mastery is not clear. R. D. Lair called such a dilemma a “knot,” and well articulated the following quote:

“There is something I don’t know that I am supposed to know. I don’t know what it is I don’t know, and yet am supposed to know. And I feel I look stupid if I seem both not to know it and not know what it is I don’t know. Therefore, I pretend I know it. This is nerve-racking since I don’t know what I must know.

Therefore I pretend I know ever I feel you know what I am supposed know but you can’t tell me what it is because you don’t know that I know what it is. You may know what I don’t know, that I don’t know it, and I can’t tell you. So you will just tell me everything.”

Donald Schon’s work takes a more depth look at the experiential nature of the design studio, however it falls focusing especially on design juries. A recent heated debate in Architectural Record over the efficacy of the design studio, too, did not discuss jury depth. The notion of criticism has been discussed over and over again in primarily in essay form or through related examples from case studies. Design juries are seldom mentioned. More importantly, perhaps, is a conscious absence of information about the educational value of design juries from what is probably our most valuable source of information: our students.

In light of this situation, this research sought to make a critical system inquiry into the architectural jury particularly from a social and psychological perspective, while including it as a primary source of information. Following issues were addressed:

1. How is educationally valuable is the system and for whom? How do students, and former students of architecture (practicing architects) compare their opinions of the jury system? Hypothesis is that current students
probably be more critical of juries than would alumni or faculty, since the students are on the "receiving end" of the criticism and since the jury experience is most immediate to them.) How do juries in school compare with client presentations in practice? (One of the common rationales for juries is that they help prepare future architects for professional presentations. Do they?) Are any changes needed in the jury system, and if so, what are some suggestions for improvement? 2) Are interim and final juries equally effective teaching and learning techniques, or is one more effective than the other? 3) How do design students cope with public criticism? 4) How do the behavior patterns (especially with regard to sleeping and eating) of architecture students compare with those in other environmental design fields, and with those outside design?

Methods
To attempt to answer these questions, a study was conducted during the course of one academic year, with a follow-up comparative portion a year later, ending in June 1985. The first and major component of the study was completed at a mid-sized western university with a relatively large Department of Architecture (approximately five hundred-fifty students in a five-year Bachelor of Architecture program and forty in a Master of Architecture program). Architecture students collected most of the data under close instructional supervision as part of two courses entitled "Behavioral Factors in Architecture" and "Directed Research." Based upon feedback from students, faculty and school administrators, various phases of the study were refined and further developed to help address issues which arose as the research progressed. Data from the second phase of research, the faculty questionnaire at the Cranbrook Teachers' Seminar, were collected by the author.

a. Phase I: Case Study
The purpose of Phase I of this research was to document certain attitudes and behaviors of architecture students and faculty in the context of design juries at a case-study school. Issues addressed included the overall educational value of juries, a comparison of the educational value of interim vs. final juries, methods of delivering and responding to criticism and students' personal eating and sleeping experiences. To attempt to answer various questions about the jury system, a variety of research techniques was used. The sequence of research is reported in Fig. 1. These techniques included:

1. Systematic behavioral observations at nine architectural jury sessions, some recorded on videotape, of a total of one hundred-thirty student presentations.

2. Interviews of: a) forty-three architecture students immediately after receiving criticism from jurors; b) forty architecture students on an ongoing basis throughout the term; c) nineteen environmental design faculty (eleven architecture faculty, and five landscape/planning faculty at the case-study school and three other architectural educators in the same geographic region).

3. Diaries of twenty-seven architecture students.

4. Questionnaires of: a) one hundred eighty-nine architecture students; and as a comparison b) thirty-two landscape architecture students; c) thirty urban and regional planning students; d) eighty-one nonenvironmental design students (enrolled in a "General Psychology" course for nonpsychology majors); and e) thirty-four architecture alumni (practicing architects) questionnaires.

5. A brief follow-up questionnaire of eighty-five architecture students.

b. Phase II: Follow-up Study of Other Schools
A year after all the data had been collected at the case-study school, a follow-up study, the second phase of this research, was conducted at the ACSA Teachers' Seminar, held at the Cranbrook Academy of Art. The seminar brought together a relatively small group of faculty and administrators from architecture programs across the country and a few from abroad. Enclosed with the on-site registration materials was a questionnaire about the jury system which participants were asked to complete and return to a lecture presentation delivered by this author. At the lecture the results of the case study were presented and a discussion session followed.

The purpose of this questionnaire was other than the case study) evaluated the jury system, and 2) to try to ascertain whether or not specific features of the case-study institution were typical, i.e., to begin to determine a limited extent which findings might be generalizable elsewhere.

The questionnaire was based upon that administered at the case-study school and the architecture students and alumni to planning, landscape, and nonenvironmental design students. In addition, i number of items were added specific for this group.

A total of sixteen questionnaires was returned. The results reflect response from faculty and administrators at fourteen institutions: twelve American and two foreign representatives. The following schools participated:

Foreign: University of Manitoba, Winnipeg, Canada; Royal Institute of Technology, Sweden.

U.S.: Andrews University; Auburn University; Ball State University; California State University, San Luis Obispo; Louisiana State University; Tulane University; University of California, Berkeley; University of Illinois at Urbana-Champaign; University of Miami; University of Oregon; University of Washington; Washington State University.

These faculty and administrators were alumni of twenty-one different institutions, including Princeton, MIT, Yale, Cornell, Berkeley, Michigan, Illinois, and several others. Most had received Master's degrees in architecture. Some had received their last degrees less than ten years ago, while a few had graduated twenty-five years ago. The majority of the respondents (90%) were over thirty-five years of age. Thirteen males and three females returned the questionnaire.

c. Data Analysis
Qualitative data were analyzed through content analysis. A series of statistic tests was used to analyze the quantified data. For the behavior observations, observation sheet was used to record behavior for each presentation at each jury session. Students presenting the work, faculty (including jurors), and other members of the class were observed.
books on body language, specific
ior patterns were placed into partic-
ted categories (offensive, defensive, and
and recorded on observation
Selected presentations were

ig is a summary of the major find-
this research. They center
ed a number of themes which are
ied in detail below.

Educational Value of the Jury
, the results of all phases of this
ch—interviews, questionnaires,
ations, and diaries—indicate that
majority of those questioned
that today's architectural jury sys-
 inadequate and needs improve-
(Fig. 2) This sentiment is echoed by
mental design students, faculty,
 at the case-study school as
by faculty and administrators at
stitutions. Ironically, the only
sampled who is satisfied with the
which their work is judged is the
nonenvironmental design stu-
they have no juries at all. Since this
ch was not limited exclusively to the
campus, but includes data
other campuses, the results appear
somewhat generalizable to other
es of architecture.

nthesis that alumni would be less
 of juries than current students was
e out. Instead, it appears that
ed to other groups, architecture,
ents, and alumni are about
 critical of the system.

vantages of the jury system,
ing to some respondents, is the
range of ideas, the fact that it sets a
ne for students to work towards,
at it is a broadening and learning
ence. For those who feel the system
improvement, suggestions for stu-
d to participate more actively, to
re prepared, more confident, to
positive attitude, and to perceive
y as a learning experience. Some of
ommendations for the faculty are
clearly the format and procedures,
 issues specifically and focus on
jectives, and to schedule the
 the project is due. Suggestions
iting critics are to become more
 with the problem, to speak to the
rather than assuming a role, to
examine all work seriously before beginning comments and to know the program and educational objectives of the course.

Furthermore, when the forty-three students were interviewed soon after making their design presentations, it was found that roughly two-thirds (63%) do not think they had learned much from the jury comments they had just heard. Only slightly over a quarter (28%) believe they had performed well, citing confidence and preparation. Poor verbal presentation, nervousness and exhaustion are the reasons cited among those who think they did only fairly. Those who think they did poorly blame their inexperience, poor verbal presentation, and lack of enthusiasm.

When asked how much they remember about projects of classmates who presented work before their own, most of those architecture students interviewed say they remember some or a lot. About half (53%) are able to give two correct examples describing previous projects and the jury’s reaction to them. However, over one-quarter (28%) cannot remember anything. Most (72%) cannot remember anything about those projects presented after their own.

The analysis of the twenty-seven student diaries revealed that students do not seem to learn much from public criticism. After a jury, only a few students were able to answer the question “What did I learn?” even though they were very articulate in describing their own thoughts and feelings about the criticism they received. Only a handful specifically stated that they digested the criticism, rectified any problems, and incorporated these criticisms into their subsequent design work. One student learned about structures, another learned to view things beyond one’s personal experience and “loosen up.” These were about the only substantive comments to be found. Desk crits seemed to be most valuable. Final crits, given at the conclusion of a project or in jury format seemed to be of least educational value.

More often than not, however, what students claimed to have learned from design juries has more to do with presentation style, or how to “play the game,” than with design. For instance, after the first crit of the term, one fourth-year student learned “to be patient, modest, courteous. To keep my talking to the bare mini-

final crit, this student learned “to speak softly but carry a gargantuan stick.”

Another student said:

“What did I learn? I learned that third year (design) is no more organized than second year was last year. I learned that . . . the teachers don’t agree on methodology. The most important thing I learned . . . is what I need to concentrate on if I want to be a good architect and the separation (between) that and what I need . . . to be an ‘A’ student.”

In a similar vein, a third-year student designing a beach house related:

“They talked only briefly about my general design when they hit on my southern, beach front elevation. Very open. They took off on a debate over energy conservation versus ocean views, and when they realized that they had gotten carried away on that one issue, they stopped and went on to the next project. . . . The instructors were too preoccupied with their own egos. They began attacking each other rather than the project . . . ”

In sum, most students in our sample of diaries and interviews appear to learn little from their final juries. Furthermore, what they do learn has little to do with design.

Three-quarters of those faculty surveyed at the ACSA Teachers’ Seminar believe that student presentations to a jury are either somewhat or very different from presentations to professional clients. Of the architecture alumni (practicing architects) sampled from the case-study school, most (82%) also concur that the two processes are quite different. Reasons for this are that a designer’s professional presentation usually commands more respect from the client than students typically received from the jurors, that the professional presentation is a more informal process than are juries in school, and that clients are much more involved throughout the entire design process than are jurors at the university. Here are some examples of the practitioners’ comments:

“I don’t believe the comparison to be a relevant one. Both situations are pressure-filled, yet . . . client presentations involve

“Often, professionally speaking, the presentation is a product of a team. In school, I don’t recall working as on any project, which I think was a great detriment. The emphasis at school was on individual creativity through the design process. As a profession see a lot of people who carry that into an office, and are almost incapable of exchanging ideas and working on a team basis.”

“The jury system is much more difficult than client presentations. Your ego and self-esteem are much more exposed and you must deal with a live audience. If you can handle a jury, you can handle a client. I think it’s a good training ground.”

“The most difficult, abusive school job, but a comedy when compared with indecisive, budget-conscious, corporate client! (not to mention the developer, the building department, or other entities an architect must deal with).”

“Totally different. Clients tend to con their comments to the satisfaction of program requirements. The school is closer to the in-office reviews of principals and other staff.”

“I believe they are worlds apart in importance. The jury in school turns a joke at the last minute, becoming a means of securing a grade in a class but a professional presentation is a part of relaying your most sacred design ideas in a way that may eventually become part of the built environment. It is more of an exciting and real-life experience, whereas the school jury is merely competition of your peers and you.”

b. The Educational Value of Interim Final Juries

Most of those questioned agree that pared to final juries, interim juries are more effective learning technique. W. interim juries seem to serve many purposes, the value of final juries appears to be minimal at best. Of all groups studied, architecture students say they learn least from final juries. (Fig. 3) Views of faculty and students on the amount learned from each format seem to differ substantially.
faculty sampled at the case-study school and neighboring institutions observed that because interim juries allow adjustment and fine-tuning of concepts, they result in more learning than final juries. Several architecture students believe that final juries, as opposed to interim juries, do not help them very much because it is really too late to alter the design. Others feel that interim juries are more useful as studio critiques. However, others believe that final juries are beneficial by offering diverse opinion opportunities for discussion and debate. And many students believe that it is at final juries where their design is complete enough for others to comment on. In sum, faculty and students believe that interim and final juries accomplish different goals.

Methods of Delivering and Responding to Public Criticism

Methods of delivering criticism at both the study school and other universities appear to be similar. Most criticism is oral and delivered in public. The little criticism is written. As a result, design students are under a great deal of stress during the jury. Unfortunately, this tension interferes with their ability to recall correctly the criticism they hear about their own work. Furthermore, their sheer exhaustion after preparing for their own work prevents them from listening to any jury comments or crits on other students' projects. Criticism seems to go in one ear and out the other.

A student's observation revealed that receiving the jury's comments, most architecture students display defensive nervous behavior. Most of this behavior is non-verbal. Most common student responses involved crossing arms and legs, avoiding eye contact, and sitting up the mouth or chin. Twiddling fingers, tapping feet, pacing, scratching backs, and biting fingernails are other signs of nervous behavior. Some faculty members were nervous too, some onlookers from the rest of the faculty observed during these sessions mirrored the students' private behavior. Students find the design process, especially crit sessions, to be a highly charged experience. The intensity of emotions described in the dissertation went astoundingly. As one student summarized, going through a crit is like "riding on a rollercoaster with no seatbelt." Emotions run high and range the full gamut from high to low. However, the vast majority of emotions narrated by the design students about juries was strikingly negative. The most commonly felt emotions are anxiety, fear, frustration, anger, embarrassment, disappointment, guilt, and disgust.

For the most part, students' feelings of anxiety centered around feeling unprepared. A few days before his preliminary jury, one fifth-year student wrote:

"I can see it now, the gallery full of other students and aggressive words exchanged between us and the jurors. My knees are literally shaking just thinking about it. The muscles in my stomach feel tense and tied up in knots."

Before his final jury, this same student wrote:

"I feel a deep sense of futility. I have spent at least eight hours a day on my drawings, staying up until 3 a.m., getting up at 8 a.m., and my drawings don't show it... As I was driving home from school today, I suddenly realized that... all my life was concentrated on that fateful Wednesday. Life beyond Wednesday was not important."

Another fearful student narrated: "I do not want to present my work. It is very superficial and unsubstantial. I do not want to be yelled at by my instructor."

Feelings of fear are often accompanied by visions of dreadful consequences. Often these fears are cloaked in a very harsh language. As one student put it, "Undoubtedly, the jury members will crucify me... my instructor is famous for tearing students up." Another student, before the final jury, made this diary entry:

"The whole weekend I have been worried sick that I'm not going to get done. I had very little sleep and am coming down with a cold and a cough. I feel awful and hate architecture at this moment. I stayed up all night last night and feel miserable. I would do anything to get out of (the jury) right now. I wish I had an accident—just anything so that I wouldn't have to face the jury."

Frustration was another emotion shared by several students. Several students complained of being cut off during presentation to the jury. As one indubitably put it:

"I was the second one to present. I must admit I wasn't as nervous as my ally am (I guess 3 x 5 note cards, an outfit, and good drawings go a long way towards making one feel prepared) ever. Visiting Juror X never let me feel my presentation (I guess he gets a lot of two-cents worth. He cut me short... so basically I hit him out and tried to finish my presentation but then he interrupted me again. I just thought, 'Well, I guess I'm thru here.'"

Others were frustrated during the juries. Contradictions among professors, bown professors contradicting previous
The Studio Subculture: Eat Sleeping Habits of Design Questionnaire results indicated that design students—especially architecture—dramatically differ from those outside the design profession. Architecture students constitute a separate group of those who do not eat as much, sleep as little, and are generally more depressed and less satisfied than their classmates. Architecture student diaries revealed a combination of poor sleep, usually little or no sleep before a project presentation, and poor eating habits. This was accompanied by an unusually high level of stress among many students experiencing "burnout," or complete mental exhaustion. A student typical of others said, "Today I presented a project. I have been up all night before and before. I was too tired even to care. I just walked over and done with it." Several students said that the highly motivated and working positive criticism was often easy to deal with. But, an entirely negative comment in the class often led to their feeling depressed and unwilling to participate in the project.

A student whose team made a presentation of a group project, expressed disappointment and explained:

"And out that our team was just displaying some ideas which were clear and... embarrassed."

students expressed positive feelings their presentation was clearly a minority (ten out of twenty-seven students). Most commonly cited pleasant emotions were surprise, relief, happiness, a sense of accomplishment, and on rare occasions, euphoria. Students tended to feel this way after a favorable critique. One student entered:

"After critique—feeling fantastic—I finally have got the idea of developing a concept through the entire design. The guest critic said 'I'm happy to be here' after looking at my project... I also got congratulated by other students... will now go home and sleep for a couple of days."

A student with a final jury went well explained:

"I feel satisfied, peaceful, proud to know I was productive and recognized. I won't forget the smile of my instructor, his arm around me, and his words, 'You're great!' At that moment, they meant so much to me."
to prevent this tendency by acting out an idea of "catharsis," a clean-up and put to bed, showered, and put on some clothes. As a result, they were out ready to begin on a new task. As a result, they were out ready to begin on a new task.

In conclusion, most who award themselves by rushing off their much needed sleep. Others often nourish a delicious meal while trying to resuscitate their bodies and their minds to working order.

The vast majority of all those questioned—faculty, students, and practitioners—believe the jury system to be a level of learning about design. Most of those questioned about academic juries and panel practice presentations are partially different, so the arguments are still being held. Design juries help prepare presenters for such presentations. The two points to notice are: 1) interim juries are a more learning technique. 3) Most criticisms are oral and delivered on the spot, the most students defensively and nervously. The intent is to defend their egos and their emotions interfere with the learning process. Study regard positive criticism— doesn’t hear it often enough. Psychologists and learning theorists have demonstrated the educational value of reinforcement; in this regard structural educators have a lot to add. Skills such as time management and oral presentation techniques are taught adequately and yet have a major impact on students’ learning.

The studio subculture differs from the lifestyle of non-students, and although this subculture fosters the sense of belonging, aspects of it may be detrimental to mental and physical health. The level of stress may be needed future architects, but the present stress is too high to be of

Fig. 4 Comparison of Environmental Design, non-Environmental Design students', and Architecture alumni's sleeping habits the night before juries or project due date (from questionnaires)
num educational benefit. Nevertheless, juries do have some positive qualities, with substantial refinement, they continue to play an important role in education.

In addition, one should not dismiss the value of juries entirely based on this study. As one colleague has suggested, serving for a jury might be comparable to attending a musical recital. In both cases, the preparation and practice will be an even greater learning experience than the final presentation. Furthermore, juries can illuminate goals besides learning design—for instance to socialize students into the subculture of architecture, and to learn to negotiate. Therefore, juries can be the only place in which the multiple subdisciplines of architecture—structures, history, energy conservation, and behavior issues—are integrated. In some cases, it is only through the jury that students view the field as a true Gestalt, the whole is actually greater than the sum of its parts. This important aspect should not be overlooked.

Conclusion, however, is that the use of stress produced by public criticism of juries is a key to understanding effectiveness as a way of learning design. Stress can be a positive tool, provided it is used in moderation. In the case of the jury system, a high level of stress is high enough to motivate and discipline students to bring their best foot forward, "so to speak," but not so high that it interferes with stability and function normally. It stems from all sources of information in the "ideal" feedback cycle discussed, not working properly, largely to stress gets in the way. Similarly, e-loop learning is not achieved, that learning does take place at a relatively low level. Systematic experimentation with a variety of presentation and feedback techniques, jury sessions—and measuring student responses to them—would help educators to fine-tune this process.

Recommendations

1. At the outset of a design project, have students and faculty (ideally the instructor and those who will later serve as jurors) establish the criteria for a "successful" outcome: i.e., what types of design features or spatial qualities will help make this an "A" project. If the criteria are spelled out clearly and commonly agreed upon, the "myth" component of the mastery-mystery phenomenon will be removed.

2. Consider scheduling a final jury or review session about a week or two prior to the actual conclusion of a project. In this manner, students can incorporate some of the revisions suggested by the faculty into their final designs.

3. Require students to have speaking in oral presentation techniques through public speaking courses or through special sessions during the year. Consider inviting faculty from academic departments such as speech communication to help students develop presentation skills. Another is to have students videotape their "practice juries," and then play back tapes so students can see themselves.

4. Consider the purpose of a presentation simply to gain practice in public speaking. Invite other faculty members to hear the presentations to judge the projects in public. Private methods of delivering critical comments (e.g., strictly in writing).

5. Ensure that all jurors, including faculty members who have written copies of the design guidelines well before the jury session.

6. Insist that students submit their work at least one full day before the presentation. This will allow them time to rest up and prepare better psychological for their jury and should help minimize jury burnout.

7. Require that written criticism to each student. (The University of Urbana-Champaign School of Architecture encourages faculty to write written criticism to students at least twice a week. Either ask all jurors to write comments on the work, or use the feedback to help determine students' grades, or else assign "buddies," i.e., a fellow classmate to take notes on the criticism during the presentation. Students are more likely to remember what they hear and see in writing, rather than what they hear.

8. Encourage faculty and guest lecturers to deliver more specific, constructive criticism. Vague statements like "This is a great project" or "This is a bad design" are part of a much more substantial, can be damaging and pedagogically ineffective.

9. Rather than reviewing each individually, use a jury to evaluate all projects together—seen in mass using a large pin-up or a
general trends and
examples can be brought
into, but names of stu-
dents. This removes
boredom and the emphasis
of comprehension at the
us sparking discussion
learning. It also
nages or disadvantages
st to last to present a

instructors might try
a variety of formats
work, and ask the stu-
help them learn the
appear the most logical

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