A COMPUTER-SUPPORTED PARTICIPATIVE DESIGN JURY

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Abstract. As the design jury changes from closed to open format, it inevitably becomes a learning environment in architectural education. But its educational goal has not been best achieved. A significant problem reported in the literature is that students are not able to participate effectively in the review process. In this research, we conducted a survey to study the local design juries and intend to interpret the survey result by examining the group process losses in conventional design juries. We also discussed the possibility to improve the effectiveness of design juries in terms of increasing students’ active participation and learning experience by integrating groupware to support a structured review process.

1. Introduction of design juries

Design juries are an integral part of architectural education; the experience of presenting work and receiving comments from a jury is an essential and important part of an architecture student’s learning experience. Even though the process has a long history and is widely practised, students are unsatisfied with design juries, finding desk critiques more effective as a learning experience (Anthony, 1991). Group review processes are central to the pedagogical benefit of design learning (Boyer and Mitgang, 1996); as a practice of collaborative learning it is an effective pedagogical solution (Vygotsky, 1978) but can be improved. This research was conducted to examine the jury experience in the light of computer supported collaborative learning and group support systems, with the intention of identifying how the conventional review process could be enhanced using digital communication tools to enhance learning.

1.1. GOALS OF DESIGN JURIES

Design studio settings include problem introduction, informal desk critiques and formal presentations. Formal presentations include interim juries and a final jury often conducted in an open environment with many participants such as invited critics, tutors and students. The design jury was initially introduced into architectural education as a forum in which to evaluate students’ completed design work and
was conducted in a closed format. As it became apparent that students expected not just a letter grade to also understand how the jurors evaluated their work, the design jury transformed from a closed to an open format. This shift moved the emphasis on responsiveness to authority (a mere letter grade) to a greater emphasis on individuality (a grade with comments and discussion and increased interaction between jurors and students) (Anthony, 1991:11).

Design juries can address many different goals at the same time: evaluation of students’ design work, practice of presentation skills, design knowledge learning and so on. Anthony (1991) argues that conventional design juries attempt to attain too many goals in one design jury, observing that while each goal may be worthwhile it is not appropriate to attempt to attain all of them.

Dinham (1986) identifies three primary purposes to design juries: (i) to criticize individual student’s work; (ii) to provide general instructions to the entire group of students; and (iii) to initiate scholarly, seminar-like exchanges, all of which are intended to extend students’ learning experience. We adopt these three goals for juries in this research. This research emphasizes that design juries are group-based design knowledge learning environments. In many schools of architecture, they provide one of the few occasions when a year of students get together to work (Jones, 1996), and skillful jurors are aware of the need to shift to group focus from individual criticism (Dinham, 1986).

1.2. LEARNING AND PARTICIPATION IN DESIGN JURIES

In conventional design juries, students verbally present and explain their design work to participants, and jurors evaluate the work and discuss design issues with the student publicly. Jurors play a major role and can dominate the review process; Doidge et al. (2000) indicate that “when the review process is working well, it provides many learning opportunities”. These include providing feedback, developing critical awareness by getting involved in discussion, and learning from everyone. Boyer and Mitgang (1996) observed that this process can be a ‘one-way communication’, thus inhibiting students’ participation to some extent.

While the design jury is a setting for group learning it is quite different from the collaborative learning usually perceived. The main technique adopted in design juries is criticism. Students learn from critiquing of their design work instead of solving a problem together. Their understanding of design evolves and expands by means of reflection-through-critiquing (Attoe, 1978). A design jury gives students an opportunity to hear a variety of opinions and ideas about their work, to learn from other people’s work, and to develop critical thinking skills (Doidge et al., 2000).

In the problem based design-learning model, design juries facilitate abstraction and reexamination of the learned knowledge (Kvan, 2000), helping students achieve higher-level learning through applying their design knowledge to evaluate other
students’ work by means of reflection and deliberation. Increased involvement in the learning process promotes critical thinking skills (Alavi, 1994) and it is an indicator of deep learning (Newman et al., 1997). It is possible to consider improving the effectiveness of design juries in terms of encouraging students’ active participation. Anthony (1991:132) proposes that “including the students as key players is essential, … a student who actively participates in the jury process is much more likely to learn something than one who simply appears”. But it is limited by various reasons. “Some are personal (for example some students are made extremely anxious by the review situation), some are organizational, and others are cultural” (Wilkin, 2000). In this research, we seek to apply computer-supported group support systems to facilitate active participation by means of activities that invoke participants’ reflection and deliberation.

1.3. ANTHONY’S SURVEY OF DESIGN JURIES

Anthony (1991) provides a comprehensive overview of design juries in North America, drawing upon a variety of data (e.g. observations of design studio, questionnaire, interviews, and dairies) collected from students, faculty, and practitioners to study the effectiveness of design juries in architectural education. The primary findings from Anthony’s survey include:

1. Students expect design jury settings to be a learning experience; students identify learning achievement among important goals for design juries.
2. Students hope to be more involved and engaged in the review process to make their learning more effective.
3. Conventional design juries are not satisfactory and not as effective as desk critiques; more constructive critiques are expected from the juries.

The surveys indicate that “design juries are the greatest source of students’ dissatisfaction”, and students report that they “learn less from juries than they do from other sources” (Anthony, 1991:35). Instead of abandonment of this setting from architectural education, she advocates “structural change in the jury system” and promotes debate and dialogue about design from many different viewpoints. Central to her recommendation is increasing students’ active participation, in particular to increase the benefits of peer review.

1.4. SUMMARY

In summary, students’ active participation has a high correlation with students’ effective learning, but it was inhibited to some extent by the conventional review process. Various techniques are proposed to restructure the review process, of which increases participation is a common strategy. Peer review increases students’ engagement and individual learning. Communication technologies have
demonstrated capacities to provide process support and improvement of productivity and participation. Groupware supported technologies are reviewed in the next section.

2. Groupware supported process

The introduction of information and communication technologies provides the alternatives to improve the productivity of group work. McGrath and Hollingshead (1994) classify the group support systems into four categories:

- GCSS: Group (Internal) Communication Support Systems
- GISS: Group Information Support Systems
- GXSS: Group External Communication Support Systems

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<tr>
<th>Common Process Losses</th>
<th>Explanations</th>
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<tr>
<td>Airtime Fragmentation</td>
<td>The group must partition available speaking time among members.</td>
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<tr>
<td>Attenuation Blocking</td>
<td>Occurs when members who are prevented from contributing comments as they occur, forget or suppress them later in the meeting, because they seem less original, relevant or important.</td>
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<tr>
<td>Concentration Blocking</td>
<td>Fewer comments are made because members concentrate on remembering comments (rather than thinking of new ones) until they can contribute them.</td>
</tr>
<tr>
<td>Attention Blocking</td>
<td>New comments are not generated because members must constantly listen to others speak and cannot pause to think.</td>
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<tr>
<td>Conformance Pressure</td>
<td>Members are reluctant to criticize the comments of others due to politeness or fear of reprisals.</td>
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<tr>
<td>Evaluation Apprehension</td>
<td>Fear of negative evaluation causes members to withhold ideas and comments.</td>
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<tr>
<td>Free Riding</td>
<td>Members rely on others to accomplish goals, due to cognitive loafing, the need to compete for airtime, or because they perceive their input to be unneeded.</td>
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<tr>
<td>Cognitive Inertia</td>
<td>Discussion moves along one train of though without deviating.</td>
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Of the four, GPSS addresses integrating information technologies to structure and support group process. From our for going review of design juries, we have identified that the major benefits will arise from process support.

The benefits of computer-supported collaborative work (CSCW) can be classified as process structure benefit, greater participation and better results (Kvan, 1999). The process structure benefit comes from a particular sequence of communication that can best be supported by groupware and such a process will facilitate deep level analysis and task-oriented communication.

In addition to supporting process structure, GPSS can address process losses (Steiner, 1972). Nunamaker et al. (1991) have classified such losses (Table 1) and noted that GPSS tools can facilitate group processes and mitigate these losses.

2.1. BENEFITS OF GPSS

Many efforts were made before the advent of information technologies to improve group effectiveness and avoid process losses, including methods such as Nominal Group Technique (NGT) (Van De Ven and Delbecq, 1974). Subsequent studies on GPSS demonstrate that groupware have unique advantages to support group process. Nunamaker et al. (1991) identify at least three features of group support systems that are fundamental to these advantages, namely parallel communication, group memory, and anonymity.

Parallel communication significantly reduces process losses from airtime fragmentation, concentration blocking, and free riding, which inhibit participation and comment generation; text-based communication enables participants’ input and read others’ input simultaneously. Group memory is a history and record of the information communicated among participants. It enables participants to pause and reflect on the information so as to reduce attention blocking. A common record of posted text provides a common memory. Anonymous input reduces process losses from conformance pressure and evaluation apprehension, and thereby encourages participation. Anonymous posting of text supports this mode of participation.

3. Our survey results

There is little information on design juries in Asia; most of our knowledge comes from surveys that were conducted in North America. Recognizing the differences in culture between Asia and North America, and in order to gain more concrete data, we investigated local design juries and compared Anthony’s (1991) descriptions of expectations and participatory behaviours with those of students in our university. By analyzing the collected data from this empirical study, we expect to find some implications for improvement of conventional design juries.

Based on the objective of this survey, questions asked fell into three categories:
questions included in Anthony’s survey, learning effectiveness of the local setting, and students’ participation in design juries. Two kinds of questions are used in the questionnaire: select-question and open-ended question. Select-questions were designed on a five-point scale. Open-ended questions help us to study students’ opinions or possible causations. The survey was distributed to all undergraduate students. The average response rate was 23.8%(50/210).

3.1. EFFECTIVE LEARNING IN DESIGN JURIES

The survey results are similar to Anthony’s description as stated above, suggesting that the culture of design juries is similar both in Hong Kong and USA. Students addressed design knowledge learning experiences in design juries and expected to be actively involved in the discussion.

The two primary issues identified in our survey data are the desire for: (i) more constructive critiques and (ii) more discussions. Analysis demonstrates that the more comments students received, the more they learned (Figure 1), with the quantity of the comments significantly affecting the effective learning of the individual who was presenting and that of others who took part in the review ($R^2=0.51$, $p<0.001$). Students’ comments and contributions are not as effective as jurors’. This may be due to fewer comments generated from students; the survey data identifies that most of them only act as passive listeners and receivers in design juries.

Figure 1. Positive correlation between effective learning and critics received.
3.2. INHIBITION OF STUDENTS’ PARTICIPATION.

The survey result shows that only 62% students go to see other students’ reviews, and only 25% students join the discussion occasionally. An open-ended question was asked to look for the causations why students cannot involve in the review process. The responses show that there are various reasons making students not active in design juries. Some students discuss their projects but not in juries, they deem design juries “are for expression of ideas from jurors”. Some students selectively join others’ reviews after their own presentation. From the explanations of those who wish but do not participate actively, we find that psychological reasons, design jury atmosphere, and arrangement of design juries may limit and inhibit their participation. Students said that they are “afraid to give comments publicly”, to “avoid embarrassing the classmates”, and they were not encouraged to join the discussion. These comments indicate that the process losses identified by Nunamaker are to be found in the design jury.

3.3. PROCESS LOSSES IN THE REVIEW PROCESS

Group process analysis was used in this research as a method to investigate and interpret deficiencies of conventional design juries. From survey results we find that process losses exist in conventional design juries that inhibit students’ participation and learning effectiveness.

3.3.1. Participation

From students’ responses to the open question of ‘why not participate’, we find that evaluation apprehensions and free riding may inhibit students’ participation. These two types of process losses can be categorized into atmosphere and psychological reasons in the survey result, which is one of the main factors that limit students’ active participation.

3.3.2. Learning effectiveness

Students expect to receive more comments and different opinions about their design work. The quantity and quality of critics are positively correlated with learning effectiveness, but it is restricted by productivity blocking and cognitive inertia loss in group discussions. Cognitive inertia loss describes the situation in which “discussion moves along one train of thought without deviating”, and production blocking is caused by focusing on listening and remembering the comments, which limits participants’ reflection on the comments and generation of new ideas. Learning is also inhibited when participation is passive. The strong inhibitors to participation reduce learning effectiveness.
4. A restructured review process supported by groupware

There are several ways of improving the jury process. It has been suggested that peer review may be better than a conventional design jury (Anthony, 1991), such as student-led crits (White, 2000). Peer review is grounded in the theory of collaborative learning and addresses student engagement and mutual endeavour to achieve active learning. The result of this empirical study suggests that greater student participation is desired, thus improving engagement, leading to improved student performance and learning effectiveness. From our survey, it appears that restructuring the review process to allow for more participation will address the most significant problems of conventional juries. How then can the process be restructured?

By comparing the ‘student-led crit’ with conventional design juries, the difference is apparent in its organization and review process. The relationship among participants relatively changed from a hierarchical structure to a flat peer-to-peer structure. The tutors’ role changes from dominating the process to facilitation. These changes reinforce the students’ responsibility to take part into the review process. Thus, the restructured process reduces process losses such as free riding and evaluation apprehension.

As indicated by White, the process can also be improved by addressing the mode of input from the tutors. He notes that “the introduction of tutor comment must not be at the expense of the other clear benefits arising from student-centered approach”. Anonymity of communication seems to be a solution at hand, although production blocking can still exist in this review process.

Another peer review process is introduced in a meeting format (Brindley et al., 2000). In this process, students present their work in sequence and state the expected feedback they would like to see regard to their work; then all generated issues are prioritized; the top issues will be selected for discussion.

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<tr>
<th>Sequence</th>
<th>Purpose</th>
<th>Benefits from groupware</th>
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<tr>
<td>Presentation</td>
<td>Students present their work.</td>
<td></td>
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<tr>
<td>Question</td>
<td>Participants write down their comments into computers.</td>
<td>Anonymous and parallel input reduces evaluation apprehension and airtime fragmentation.</td>
</tr>
<tr>
<td>Selection</td>
<td>Choose the desired comments for discussion.</td>
<td>The voting process facilitates students’ reflection and deliberation.</td>
</tr>
<tr>
<td>Discussion</td>
<td>Discuss the selected issues with the aid of a shared electronic paper.</td>
<td>Reduce attenuation blocking.</td>
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This review suggests that it is possible to integrate groupware tools to support a restructured review process that will reduce process losses. This process model and the benefits from groupware are summarized in Table 3. The review process is divided into four sections: presentation, question, selection, and discussion.

While GPSS can improve the jury process, problems are also introduced. The time given to each student in a jury is limited, but groupware supported discussions appear to need more time than that without such support. In order to address this in the design jury context, we propose to combine two sections: question and selection into one section by adding a facilitator role. The facilitator (who could be the tutor, student or visitor) is in charge of selection of questions for discussion, and adopts an agenda to facilitate information exchange between participants and the facilitator. A process model reflecting this is illustrated in Figure 2.

![Figure 2. A restructured process model supported by groupware.](image)

This review process model can be divided into two stages: generation of topics for discussion and discussion of the selected topics. The generation stage is supported by groupware. After a student’s presentation, participants (tutors and students) will be engaged in asking questions in a structured format assisted by computers. Each question includes a topic and an explanation of the topic. We suppose this structured questioning will lead to more explicit and constructive critics. At the same time, a facilitator (either a tutor or an experienced student) will be invited and in charge of choosing topics that are appropriate for discussion. To facilitate information flow, an agenda is used to receive questions from participants and send them to the facilitator, and collect selected questions from the facilitator and prepare for the discussion in the next step. In this model, process losses, including evaluation apprehension, airtime fragmentation, cognitive inertia, and production blocking, are reduced by anonymous communication and parallel input.
5. Discussion and future work

Hollan and Stornetta (1992) suggest that communication technology has unique advantages that are not met in face-to-face communications. So the goal of designing a system becomes to identify the needs of the context and to plan the mechanism that could carry forward the strength of the new medium to meet the needs. Such a concept is reflected in the EMS project (Nunamaker et al., 1991). Our research is also developed in this way. To design a group performance supported system (GPSS) to be used in face-to-face design juries, first we conducted a survey to investigate and testify the needs in design juries. By considering the benefits of groupware, a review process model is proposed in this paper.

Comparing our system to the process undertaken in conventional design juries, we find that an additional stage is added into conventional design juries: the preparation of topics for discussion. This additional stage comes from the advantages of groupware, and possibly benefits students’ learning in two ways:

1. Makes the discussion more effective to all participants.
2. Students are actively involved in this process. Whether their questions are being selected or not, students will pay more attention to the discussion because they raised their own opinions. By comparing with those of others, they will be more motivated to learn. The stronger the motivation, the more likely that the students will learn.

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