Architects and School Children: In Touch or Out of Focus?

Sherry Ahrentzen
Department of Architecture
University of Wisconsin-Milwaukee
Milwaukee, Wisconsin 53201
U S A

Gary W. Evans
Program in Social Ecology
University of California, Irvine
Irvine, California 92713
U S A

Summary

To what extent are elementary school teachers and students receptive to the design features architects emphasize in their schools? Are there particular design features architects feel important to incorporate in a school design that students and teachers relish or dislike? And to what extent can the gap between students' functional needs and aesthetic preferences and architects' conceptualizations of those needs and preferences be bridged by teachers? In-depth case studies of five elementary schools reveal that while teachers are somewhat sensitive to the range of children's needs, teacher and child prioritizing of these needs differs considerably. Children, for example, feel most positively about secluded study spaces, room shape and size characteristics, whereas teachers emphasize perimeter openness, display areas, windows, and sink areas. Teachers are also unable to predict what types of spaces children prefer in which to study. In addition, architectural features that teachers and students considered most important were included frequently in the design, although architects did not consider these salient elements of their design program or intentions. Analysis of the programming process in school environments indicates multiple points of entry for direct communication of student needs in addition to those of teachers and educational administrators.

Résumé

Dans quelle mesure les enseignants au niveau primaire et leurs élèves sont-ils réceptifs aux caractéristiques architecturales de leurs écoles? Parmi ces éléments que les architectes considèrent comme importants à la conception d'une école, y en a-t-il que les élèves et leurs professeurs apprécient ou d'autres qui ne leur plaisent pas? Dans quelle mesure les conflits entre les besoins fonctionnels et les préférences esthétiques des élèves et la manière dont les architectes conceptualisent ces besoins et préférences peuvent-ils être arbitrés par les enseignants? Cinq études en profondeur effectuées dans des écoles primaires révèlent que, bien que les enseignants perçoivent relativement bien les besoins de leurs élèves, ils n'ont pas les mêmes priorités par rapport à ces besoins. Les enfants, par exemple, placent l'accent sur des pièces dont la forme et les dimensions sont de type fermé, alors que leurs professeurs soulignent l'importance de

périmètres ouverts, de zones facilement accessibles, des fenêtres et de l'installation de l'eau courante dans chaque pièce. Les enseignants sont également incapables de prédire quels types d'espaces les enfants préfèrent. Les études ont en outre démontré que les caractéristiques architecturales que les élèves et leurs professeurs considéraient comme les plus importantes étaient fréquemment inclues aux bâtiments construits, ceci bien que les architectes ne les considèrent pas comme constituant un aspect saillant de leur programme ou de leurs intentions. Une analyse du processus de programmation des environnements scolaires indique de nombreuses possibilités d'aborder, sur la base d'une communication directe, les besoins des élèves comme ceux des enseignants et du personnel administratif.

1 . Designing schools

Viewing the world "through the eyes of a child" may imply a simplistic and playful perspective on the world. Such an expression is appealing to those architects who desire in their designs the untainted, imaginative, and whimsical perspectives of childhood. With this perspective, many architects create the environments children see and inhabit. Designing settings which children use nearly exclusively - schools and playgrounds, for instance - would seem to provide an opportunity "to let the child out" of the architect. These settings must be responsive to the needs and abilities of children while still engaging their interest and enticing their curiosity. However architects do not design schools or playgrounds exclusively for children. Between the architect and the primary users is a series of other individuals - engineers, facility planners, school administrators, fiscal analysts, government officials, teachers, media specialists - promoting their own interests and their interpretations of the children's. Compared to school children they are more accessible to the designer and more influential in ensuring that their interests are conveyed to the architect and implemented (Rivlin & Wolfe, 1985). With these obstructions, the connection between architect and child may be tenuous, fleeting, or completely lost.

What then is actually lost? Numerous critics have pointed out the loss of information when the gap between architect and client is wide (cf. Lang, Burnette, Moleski & Vachon, 1974; Preiser, Rabinowitz & White, 1988). Partially in response to these criticisms, some programs have been initiated to bridge the gap between school architects and school children (Eriksen, 1977; Holt, 1974; Sutton, 1985).

In the school design process children noticeably differ from those who dictate and attend to their needs - differ from them in size, cognitions, values, use and control. Do architects leave the "mind set" of the adult world and attend to these differences? In other words, are the architect's design intentions similar to the concerns of these primary users? Are there particular school design features architects feel important to incorporate in a school design that students and teachers relish, dislike, or simply ignore? Can teachers, who are closer to students than architects, represent the environmental needs of the students? Since teachers' opinions toward classroom design may be solicited or they may be asked to sit on design charettes, can they provide the important connection between architects and students?

A school district in Southern California provided a variety of elementary school settings where we conducted an empirical study to answer these questions. The school district encourages innovative school designs yet also contains some rather traditionally designed schools. Five schools were included in our study. Thirteen teachers and

65 randomly selected students (age between 8 and 12) were surveyed as well as the architects of all five schools. The architects interviewed had extensive backgrounds in school design. One firm, designing schools for the past 25 years, was responsible for over 300 schools across the nation. None of the firms had engaged in social science research or evaluation of their school designs. Although this sample is small and somewhat selective, the information richly describes and compares the attitudes of these users and architects, thus providing a descriptive base on which to build and test future hypotheses.

We decided to focus our attention on the classroom instead of the entire school site. Even in the aftermath of the open-education philosophy, students are required to spend most of their time and efforts in classrooms, only occasionally roaming through libraries, playgrounds, or other areas of the building. Classrooms continue to be the core setting for school life.

We met individually with teachers and students and asked them a battery of questions: What physical features of their classrooms they liked and disliked; what changes they would like to make; how much and what kinds of distraction they experienced; their ability to find a private area; places in the classroom where they liked to study; and their overall satisfaction with the classroom. When we spoke with the architects we asked them to list the critical elements in the design program and their rationale for choosing them; how much they thought teachers and students liked their classrooms; how they themselves rated the classrooms; what they would like to redesign if they could; and any changes that were made after the initial design but before construction.

Interviews for students, teachers, and architects involved both open- and closed-end questions. Because of the small non-probability sample, only descriptive statistics were used.

2. Architects and Users

As seen in Figure 1, students and teachers were only marginally receptive to the design features that the architects emphasized. Teachers in each school appreciated at least one element the architect emphasized. For example, 50% of the teachers in one school liked the shape (hexagonal) and extra corners found in their classrooms, a feature the architect had particularly favoured in his design. Students, however, were harder to please: in one school no students mentioned any of the features that the architect consider salient.

As mentioned before, architects must design schools to suit the needs and interests of several groups; many of the design features they deem salient may be those that suit the interests of individuals other than the primary users (Rivlin & Wolfe, 1985). For both teachers and students, amenities such as sinks in classrooms and sliding chalkboards were very important classroom features. However these features were not even mentioned by architects as salient characteristics in their design. In addition, one-third of the users mentioned liking the area and volume of their classrooms, yet not one architect mentioned the volume of the space as being a particularly prominent feature in the design program. *Thus, features that teachers and students considered most important were included frequently in the design but these features were often not viewed by the architects as salient elements of the design program.*

Sherry Ahrentzen and Gary W. Evans

SALIENT DESIGN FEATURE		PRECENTAGE OF USERS REPORT'G FEATURES AS FAVORABLE ASPECTS OF THEIR CLASSROOM	
		STUDENTS	TEACHERS
ARCHITECT	CONTAINMENT OF CLASSES	0%	0%
	SECLUDED STUDY SPACES	67	67
ARCHITECT	OPENNESS OF PERIMETER	0	0
	SHAPE AND CORNERS	30	50
ARCHITECT	OPENNESS OF PERIMETER	13	33
	SECLUDED STUDY SPACES	67	0
	WINDOWS	0	33
ARCHITECT	CONDITIONING & CLEANING EFFICIENCY	0	0
	OPENNESS OF PERIMETER	0	50
	CIRCULATION	0	0
ARCHITECT	OPENNESS OF PERIMETER	20	50
	CLASSROOMS IN CENTRAL AREA	0	0

Fig. 1   Users' attitudes towards salient design features in schools.
Attitude des utilisateurs par rapport aux caractéristiques salientes de l'architecture scolaire.

The perimeters of these classes ranged along a continuum of openness/containment. The degree of openness and containment of classrooms, perhaps the most controversial aspect of school design (Gump, 1987), was subject to mixed interpretations. In two schools, the architects said they emphasized flexibility in the design by providing more open perimeter space and demountable walls. In these schools a minority (13 to 20%) of students liked this flexibility and openness. In two other schools the architects had emphasized qualities of either containment or openness, yet the students in these schools perceived qualities opposite to those intended by architects. One architect emphasized containment in his design, yet 20% of the students at that school liked the openness and flexibility of the school, none mentioning containment! Another architect stressed openness and flexibility yet 20% of the students liked the containment of their classrooms, none mentioning openness! These discrepancies illustrate how adults and children may perceive classroom space differently. Different experiences may explain some of these discrepancies. For example, some students may view their present classrooms as quite open because last year they were in a classroom with more walls. However, these discrepancies may also be explained by different cognitive and spatial abilities between child and adult. A 16 foot ceiling may seem comfortable to an adult but create an amorphous space to a first-grade child (see Ill. 1). A teacher may place several bookcases around an open classroom to define the space while still trying to maintain a sense of openness. Yet to the students who are shorter than the bookcases, this sense of openness is lost.
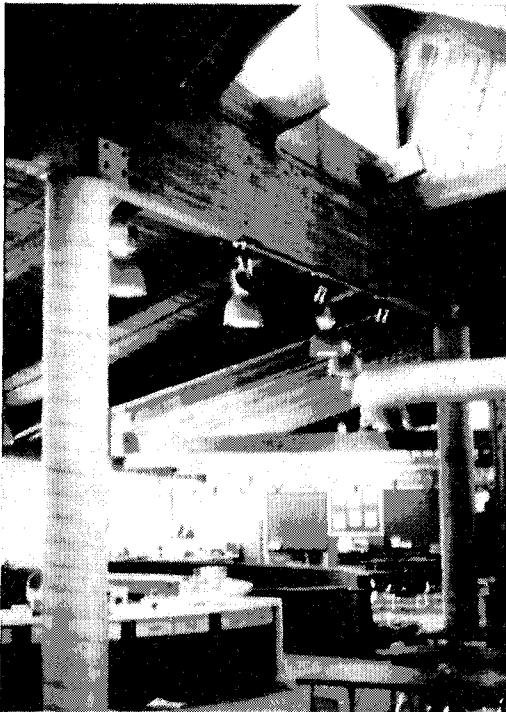
Ill. 1   High ceilings may be interpreted differently between students and teachers
Les plafonds hauts peuvent être interprétés de manière différente par les élèves et les enseignants

In each instance, the architect did not decide the extent to which a school should be open or contained but rather followed information about the degree of containment/openness set by administrators, teachers, and parents. These policies were set for reasons of teaching methods, visual surveillance, and need for teacher support. No architect mentioned student distraction as a reason for designing more contained classrooms. (This absence may be due to a number of factors: the architect forgot to mention it in the interview; the administrators stressed it but the architect ignored it; distraction was forgotten or thought unimportant; or it might have seemed so basic that it was implicitly assumed). Nevertheless, classroom design is intertwined with the potential for distraction and subsequent adjustments in users' behaviours. For instance, we found that those teachers in classrooms with a high percentage of demountable walls perceived their classrooms as being unable to dampen noise, and so they consequently adjusted their teaching styles and curriculum, and initiated new rules to cope with the design of their classrooms (Ahrentzen & Evans, 1984).

3. Teachers and Students

In order to determine if teachers could represent the environmental needs of students, we compared teachers' and students' responses of favourable and unfavorable classroom features and desired classroom changes, and asked teachers where they thought their students liked to study in the classroom.

Students and teachers were very similar in their requests for more windows, floor area, secluded study spaces, and larger desks. However, they differed significantly along other environmental needs. The students expressed stronger desire for more walls (in classes with a great deal of open perimeter space), for less walls (in classes which were relatively self-contained), and in more sound-absorbent materials. These environmental differences reflect the differences in sensitivity to noise between teachers and students, with students reporting more noise and distraction than their teachers.

In comparing the physical features of the classrooms favoured by students and teachers, teacher responses were similar to student responses. However teachers prioritized classroom features differently than students and mentioned fewer features (see Figure 2). Spatial characteristics such as openness and flexibility of classroom perimeter, secluded study spaces, and floor area were favoured features, as were amenities such as sinks, carpeting, chalkboard features, windows and bulletin boards.

In assessing what users found unfavorable about their classrooms, students disliked the openness of the classroom perimeter. Student desks were also singled out: they were either too small in desk top or storage space, or were disliked because they were tables and not separate desks. Some students thought their classrooms were too small. Teachers' dissatisfaction with classroom settings were quite unlike students', reflecting different role needs. Absence or poor condition of amenities were frequent responses: lack of windows, poor electrical and air conditioning mechanisms, insufficient storage and chalkboard features.

Spatial characteristics such as the small size of the classroom and lack of secluded study spaces were also mentioned. Ironically, the perimeter characteristics that students disliked were mentioned by only one teacher. Students' desks were not given any teacher consideration (see Figure 3).
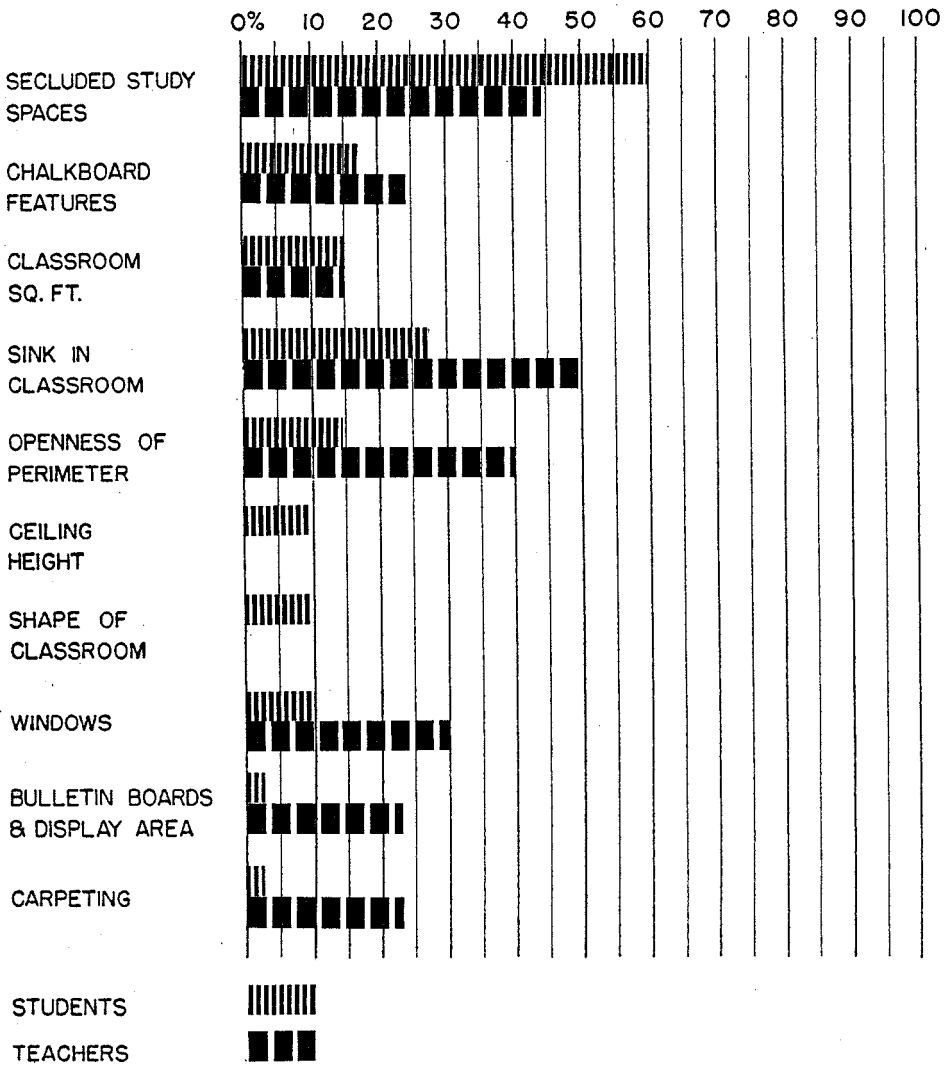
Fig. 2   Comparison of favourable classroom features between students and teachers
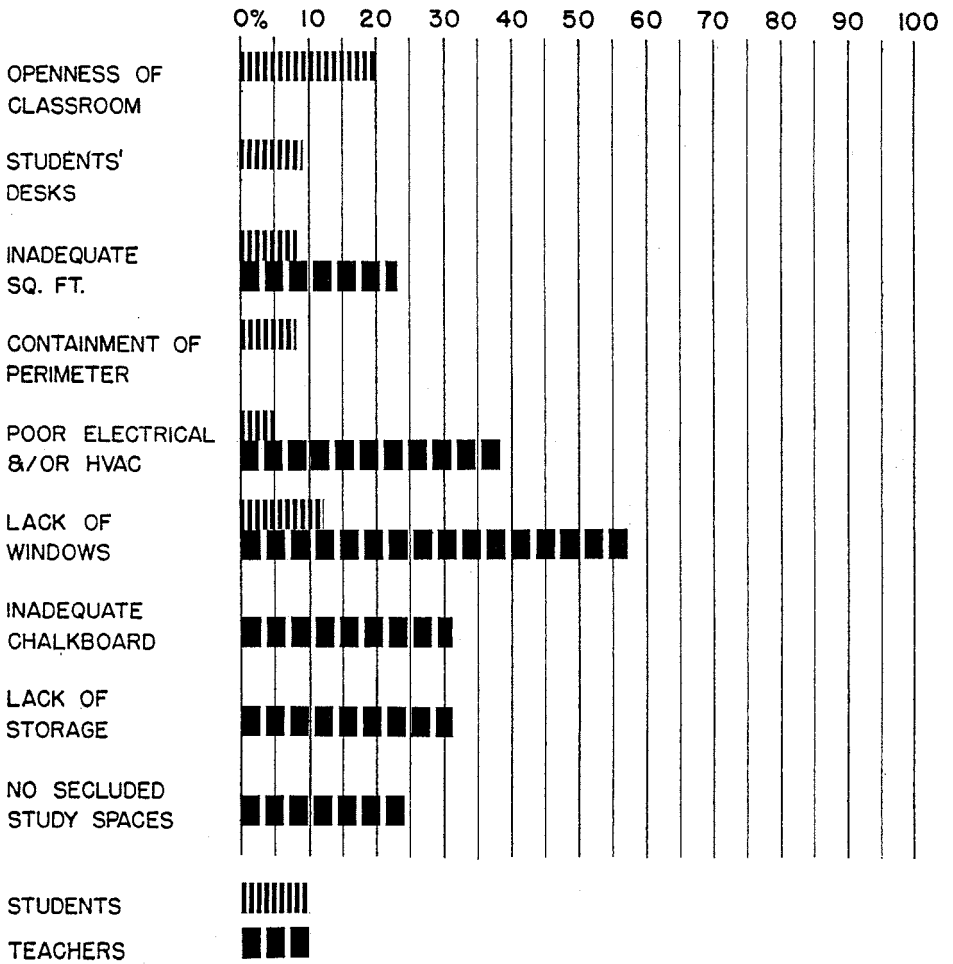Comparaison des caractéristiques appréciées par les élèves et les enseignants

Fig. 3   Comparison of unfavourable classroom features between students and teachers
Comparaison des caractérisitques critiquées par les élèves et les enseignants
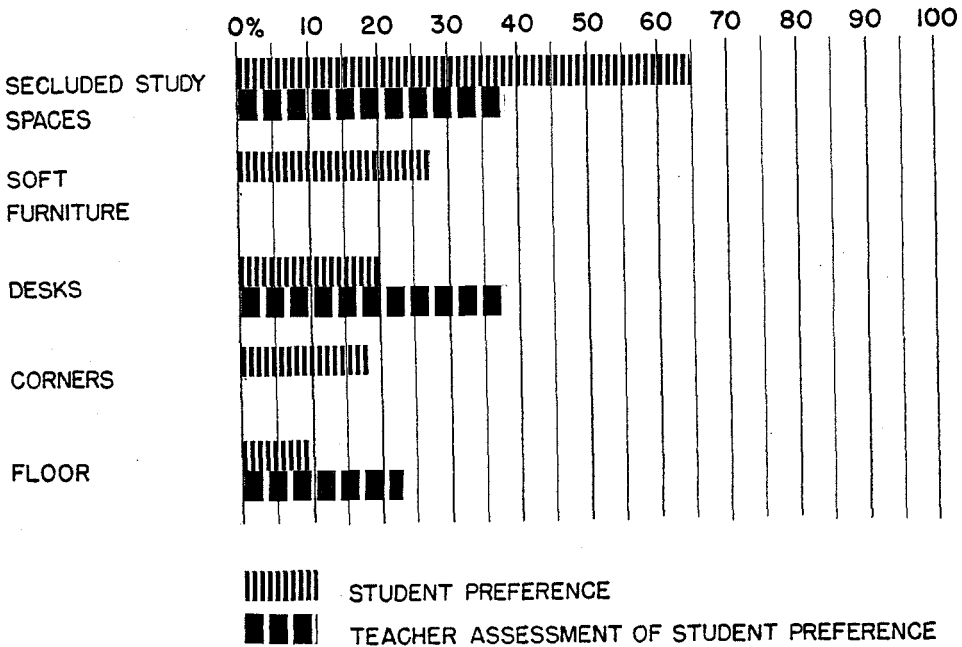
Fig. 4 Comparison between student preferences for reading areas and teachers' assessments of those preferences

Comparaison entre les préférences des élèves par rapport aux 'coins lectures' et l'évaluation que font les enseignants de ces préférences

In assessing their students' preferences for spaces to read, teachers place less importance on secluded study spaces and corners, and greater importance on desks and floors than actual student preferences indicate (see Figure 4). To work on math, 71% of the students prefer to study at their desks while a small minority, 15%, prefer secluded study spaces. Teachers more accurately assessed this preference with 62% mentioning desks.

In sum, teachers have good but incomplete knowledge of students' environmental needs. They do not prioritize the range of settings and spaces that are important to children in school as reported by them. Moreover student and teacher priorities differ.

4. Summary of Student Preferences

The preceding comparisons included much information about students' perceptions of their classrooms. *Secluded study spaces, sliding chalkboards, sinks in classrooms, and large classroom sizes were especially favourable classroom features. Openness however was a frequent complaint. If given the opportunity to change their classrooms, these students would make them bigger, add more soft furniture, add more walls and doors, more corners, secluded areas, and make desk improvements.*

A frequent complaint of students is distraction, whether from a neighbouring class or from classmates. Where do students go when they need to get something done or to concentrate? When a classroom contains a secluded study space, the majority of students (60%) prefer to use such spaces for concentrated study. These secluded study areas are physically distinct areas, smaller in scale and size than the regular classroom and intended to accommodate only few students. They are physically separated from the rest of the classroom by either changes in floor level or walls and partitions. Students also go to corners (20%) or to their desks (37%) when they need to concentrate.

5. Conclusions

In many instances in our study, architects' design intentions, when adjusted for administration requisites, are consistent with a number of student needs. We previously questioned whether teachers could be viable liaisons between students and architects. This small survey suggests that teachers are limited in conveying the varied needs of their students.

The spaces students report using when they need to concentrate - secluded study spaces, desks, and corners - are generally small, confined, or territorial spaces; in other words, "intimate" spaces as distinguished from the ambiguous space in the classroom proper. Children also sit under tables or bookcases when they want to be alone: again a reduction in scale, a separation from the classroom proper. Coupled with our findings that students predominantly work individually rather than in groups (Ahrentzen & Evans, 1984), this desire for "intimacy" of space when concentrating translates into "intimacy of one".

However, the importance of these "intimate" spaces generally is not recognized. Secluded study spaces rarely are found in schools, and if so, they often are shared between two or three classes, limiting a student's access to them. Usually classrooms are rectangular, thus limiting the number of corners to four. Four corners rarely can satisfy the privacy needs of a class of 30. A child's desk may consist of a tabletop shared with 3 other students, with tote-trays that are removed when one needs to change desk or class locations. Interestingly, when we asked students to name spaces they felt were their own private areas, over one-quarter referred only to their tote-trays and not to a type of seat or desk configuration.

Our data on children's preference judgements should also be considered in light of previous observational studies of children in open-plan schools. For example, the value of secluded spaces has been shown in a careful series of observational studies by Weinstein (1987). She found that secluded spaces encouraged better utilization of reading areas, enhanced self-control, and appeared to foster better concentration on demanding cognitive activities among elementary school children. Our data on the salience of personal desks and other props that afford a sense of personal territory is

consistent with developmental research on the importance of privacy and territory in young children (Wohlwill & Heft, 1987).

Recently Moore (1987) found that modified open school plans promote better learning environments for young children in comparison to either traditional school room designs or more radical open space plans. Modified open plans provide a variety of small, well defined activity spaces which are sufficiently open to see learning opportunities but enclosed enough so auditory and visual distractors are shielded from students. Data on high school students suggest similar trends (Evans & Lovell, 1979). These observational studies explain why students in our study in traditional classrooms wanted more openness and flexibility and students in the open plans wanted more enclosure and structure. As Moore's work clearly shows, a *moderate* amount of open plan structure best suits the educational needs of most students.

Neither students nor architects dictate school design. Environmental needs of students, although not ignored, are frequently de-emphasized when implemented. Although they may recognize and employ environmental features conducive to students' needs, architects often are limited to a narrow set of options and opinions, typically those of school administrators, and to their own cognitive and spatial prejudices of an adult mind. To more fully meet the needs of children the traditional design "hierarchy" needs to be restructured and amended with information from students playing a more prominent role in this transmission. Architects, when visiting schools, should note user modifications (two classes we looked at had constructed their own secluded study spaces from cardboard). The construction of a new school can be a learning experience for both architects and students. A scaled-down version of the architects-in-schools program (funded by the National Endowment for the Arts) could be initiated by the school district when developing a new school. Architects could explain to students how buildings are constructed. Programs of environmental assessment and awareness of the built environment could be initiated. Children could draw pictures or write essays about the physical design of their school and what they would design if they were architects for a new school. More imaginative, participatory modes are also available for facilitating greater involvement of children in the design and programming of educational spaces. Several recent demonstration projects reveal that young children understand, enjoy, and can contribute valuable insights that designers can use, by actively participating in hands-on model building and construction projects (Hart, 1987; Noschis, 1982).

Students do not have wild or fantastic expectations about school settings. Their environmental needs are often direct and amenable for design and development. When dealing with budget analysts, administrators, bankers, and subcontractors, it is easy to overlook those who end up with the final product. As Robert Propst aptly stated:

> Long after the chemical valence or theorems of geometry are forgotten, the impressions and experiences of the world in which they were learned remain to vitally affect the way we perceive ourselves and the universe.

BIBLIOGRAPHY

AHRENTZEN, S. & EVANS, G.W. (1984), Distraction, Privacy and Classroom Design, *Environment and Behavior*, **16** (1984), 4, 437-454.

ERIKSEN, A. (1977), Architects in the Elementary and Secondary Schoolroom, *AIA Journal* , **66-67**, (1977), 112.

EVANS, G.W. & LOVELL, B. (1979), Design Modification in an Open Plan School, *Journal of Educational Psychology* **71** (1979), 41-49.

GUMP, P. (1987), School and Classroom Environments, *Handbook of Environmental Psychology* (D. Stokols & I. Altman Eds.) (Wiley, New York).

HART, R. (1987), Children's Participation in Planning and Design, *Spaces for Children* (C. Weinstein & T. David Eds.) (Plenum, New York).

HOLT, J. (1974), Involving the Users in School Planning, *School Review*, **4** (1974) 82, 707.

LANG, J., BURNETTE C., MOLESKI, W. & VACHON, D. (1974), Emerging Issues in Architecture, *Design for Human Behavior* (J. Lang, C. Burnette, W. Moleski & D. Vachon Eds.) (Dowden, Hutchinson & Ross, Stroudsburg, PA).

MOORE, G.T. (1987), The Physical Environment and Cognitive Development in Child-Care Centers, *Spaces for Children* (Plenum, New York).

NOSCHIS, K. (1982), The Child in the Laboratory: Not Just Conforming to Props, *Mind Child Architecture* (J. Baird & J. Lutkin Eds.) (New England Press, Hanover NH).

PREISER, W.F.E., RABINOWITZ, H.Z. & WHITE, E.T. (1988), "Post Occupancy Evaluation" (Van Nostrand Reinhold, New York).

RIVLIN, L. & WOLFE, M. (1985), "Institutional Settings in Children's Lives" (Wiley, New York).

SUTTON, S. (1985), "Learning Through the Built Environment" (Irvington).

WEINSTEIN, C. (1987), Designing Preschool Classrooms to Support Development, *Spaces for Children* (C. Weinstein & T. David Eds.) (Plenum, New York).

WOHLWILL, J. & HEFT, H. (1987), The Physical Environment and the Development of the Child, *Handbook of Environmental Psychology* (D. Stokols & I. Attman Eds.) (Wiley, New York).