
Functional School Buildings Don't Just Happen

Part II

By George P. Babcock

Society today is rapidly moving away from traditional values and fixed modes of conduct typical of the eighteenth and nineteenth centuries. In spite of rapid social change, however, schools still retain many ties with the past.

The public school system was born during the throes of the Industrial Revolution. Rote memorization, regimentation, and harsh discipline were some of the worst features of its early years.

Although in recent decades concern for the individual has become more apparent, both public and private educators continue to be trapped by overreliance on some traditional procedures. Educators too often overemphasize "telling"—perhaps because this is the customary method of instructing a standard-size group of pupils in a classroom of traditional size and shape.

Leggett *et al.* indicate that the accepted manner of describing a school day is by listing the number of classrooms it contains.¹ Each classroom represents a cellular order of space (for the designer) and a unit of educational organization (for the teacher and pupils).

Many schools, both in organization and design, resemble egg

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crates. Too much emphasis is placed on collectivities, and not enough on persons. Future educational emphasis will not depend so much on the quantity of facts learned as on the person's ability to locate, judge, and use information.

Literature on the subject strongly indicates that, in the future, those who can quickly learn new procedures, understand changing processes, and learn on a continuous basis throughout their lives will have the most to offer an employer. The individual most in demand will be the one with a keen and flexible mind. Perkins postulates that in the near future, man's greatest reward may no longer be economic but rather psychological—the pleasure derived from involvement in creative work and from encounters with new problems. As a consequence, education will stress the processes of thinking, learning, and creativity.²

Like society at large, schools are experiencing a time of rapid change. Therefore, the school system should reflect, as soon as possible, the findings of relevant, reliable research. In order to achieve this, many conditions must be met. To date, one of the reasons for the gap between theory and practice has been the high cost, combined with a lack of vision regarding the need to remodel or build physical facilities that accommodate innovative practices.

Since permanence in educational methodology is unlikely, school building design must permit easy and economical interior space changes. The prime requirements of future school design may be summarized as follows:

1. Sufficient space for organic educational processes to achieve optimal performance.

2. Appropriate spatial and envi-

ronmental flexibility for optimal learning performance.

3. An aesthetic and psychological environment based on the nature and learning needs of the individual child.

4. Provision of the above prerequisites within the developing economic framework of society.³

Classroom Size Implications

Classroom size, either in terms of total area or area per pupil, has both educational and economic implications. Since 1945 educators and school architects seem to have assumed that instruction would improve as classroom size increased. Even if this were true, the economic implications of increasing classroom size must still be considered. These include the initial cost, a debt service charge, cleaning and maintenance costs, as well as temperature and ventilating expenses. The question arises, therefore, whether money for classroom construction is being spent wisely in regard to both its educational function and the interests of the taxpayer (or constituent) who must foot the bill.⁴

In the past, classroom space requirements have been arbitrarily determined by educators and architects. A few years ago 550 to 700 square feet was considered enough space for an elementary classroom with 40 to 50 pupils.⁵ About 1945 a trend began toward larger classrooms of 900 square feet or more to house smaller classes of 25 to 30 pupils. Thus, the recommended area per pupil in the elementary school has nearly doubled from 15 square feet per pupil in the mid-1920s and early 1930s to 30 or more square feet per pupil in later decades.⁶ However, scanty evidence has been available to help determine the most functional and economical design for classroom construction.⁷

After all these years, authority, precedent, and opinion are still the rule in determining classroom space requirements. In 1951, for example, recommendations were made, without the basis of research evidence, that elementary school classrooms contain as much as 1,200 to 1,500 square feet of floor space.⁸

A number of questions about the school program and its implications for classroom construction will require more objective evidence than is presently available. Daniels raised the following questions, which still have no definitive answers:

1. Does the current and projected educational program require classrooms of the size dictated by present-day opinion? When the program of education was of the more formal recitation type, were the space requirements less than when the activity program became the accepted practice? Under the formal subject-matter-centered program of education the recommended area per pupil was 17 square feet or less and the furniture was fastened to the floor in straight rows. With the advent of the activity-centered program there came increased demands for more space and for movable furniture. In addition smaller classes were advocated. Is the position of requesting more space for smaller classes defensible? Is the activity-centered program a fact or myth? Has there ever been widespread acceptance and practice of this type of program, or was it accepted briefly, and has it now run its course? Did the advent of Sputnik and other technological, social and economic factors in the 1950s force a reevaluation of the program of education and result in a return to more formal academic experiences for learners?

2. Does the practice of constructing classrooms with a per-pupil area of 30 or more square feet enhance or inhibit the pupil-teacher and pupil-pupil relationships? Are teacher control and pupil behavior better in small or large classrooms? In which size classrooms do the pupils have more desirable social relations?

3. Does communication become a problem as the size of the classroom increases? Are optimum seeing and hearing distances possible to determine objectively? Does the teacher put forth more or less effort to communicate in the large or small classroom? Do pupils receive sensory impressions more easily in a large or small classroom?

4. What is the most efficient design for the school building? When a new school is

designed and it is found necessary to cut costs, the facilities usually cut are auditoriums, multipurpose rooms, and special teaching areas. Of course, some minor reductions in costs may result from eliminating some heating and ventilating equipment, by delaying site development, or by using less expensive and lower-quality construction materials; but in general, building costs are usually lowered by reducing the square-foot area of the total building. Whether this saving is justified in terms of function has not been objectively determined. Might the purposes of education be served better if the multipurpose rooms, the auditoriums and the special teaching areas remain in the plans and the construction costs were reduced by decreasing the classroom area to an objectively determined required area per pupil.⁹

Although the questions raised above are beyond the scope of this article, they do have a direct bearing on the construction of classrooms for the future. School building planners make decisions that will affect education for many years to come. Inevitably, many unanswered questions result from continuous changes in philosophy and practice. The question of proper classroom size for optimum efficiency and economy remains unanswered even for present-day programs of education.

In an interview, this researcher learned that in 1960 Dr. van Zwoll, retired Professor of School Administration at the University of Maryland, visited ministries of education in Norway, Sweden, Denmark, Germany, the Netherlands, and Switzerland in order to assess standards, practices, and bases for determining classroom size. He found that in Norway the average classroom contained 21.6 square feet per pupil, in Sweden 21.6, and in Denmark 14.5. Germany had a spread of 21.6-27.0, the Netherlands had a span of 12.9-16.6, and Switzerland had a range of 18.3-24.8.

Van Zwoll concluded the interview by saying, "Interviews with educators and school architects in the respective ministries of education revealed a lack of evidential or experimental basis for the stan-

dards advocated. There was evident on the part of the educators a tendency to regard any increase in classroom area or area per student as advantageous."¹⁰

In a paper presented at the annual convention of the American Education Research Association in 1963, van Zwoll reported on graduate students' experiments in school plant planning classes at the University of Maryland. In this experimentation some form of movable partition and different arrangements of furniture were used to gradually reduce the usable square foot area in elementary, junior and senior high school classrooms to a point where the teacher, and sometimes the pupils, indicated that normal instructional activities were affected. In certain experiments the area was then increased until it was considered by teachers and pupils to be satisfactory. The findings indicated that the lowest satisfactory area per pupil ranged from 3.2 square feet per pupil to 22.8 square feet per pupil, with a median of 19.6 square feet per pupil. The lowest satisfactory area is less than one-sixth the 20 square feet per pupil recommended by most authorities. In summarizing these findings van Zwoll states:

In a number of instances problems of 1) discipline, 2) communication, and 3) identification with the class group were observed when the utilizable area was greater than the minimum satisfactory area per pupil.

Teachers and pupils described the teaching and learning situations in rooms within the minimum satisfactory area per pupil (i.e., in rooms which provided from 13.2 to 22.8 square feet per pupil) as one in which:

1. discipline problems were at a minimum.
2. pupils felt that they got to know each other better.
3. a group spirit was strengthened.
4. the teacher could be heard by all with less exertion on his part.
5. general problems seemed reduced below what had come to be regarded as normal.
6. the somewhat reduced classroom area produced a feeling of coziness.

7. everyone seemed happier.¹¹

A survey of eight private schools with 67 teachers and 16 parochial schools with 196 teachers in metropolitan Washington, D.C., was conducted by Hervey to get the opinions of teachers on the adequacy of the per-pupil space provided in their classrooms. He found that all parochial teachers with classrooms of at least 16.5 square feet per pupil were satisfied with that area. In the private schools, of the 67 teachers, only two expressed dissatisfaction with a per-pupil area over 20 square feet.

Of the 263 teachers surveyed, 209 expressed satisfaction with the area per pupil in the classrooms they were using; 54 expressed dissatisfaction. Of the 209 satisfied teachers, 149 had classrooms with per-pupil areas from 8.5 square feet to 19.4 square feet. Of the 54 dissatisfied teachers who felt they were handicapped by the per pupil areas in their rooms, 52 teachers taught in rooms that provided from 7.5 square feet up to 17.4 square feet. Of the 263 teachers, 208, or nearly 80 percent, believed that lack of space did not handicap instruction.¹²

Additional studies reinforce the research described above. In these studies achievement in subject matter,¹³ role behavior of pupils,¹⁴ number of kinds of pupil activities,¹⁵ and deviant pupil behavior¹⁶ were apparently unaffected when the area per pupil was reduced to less than 30 square feet. The conclusions of the studies, therefore, imply that a classroom area of 20 square feet per pupil is a sufficient allotment. Obviously, money could be saved in school construction by building classrooms with a per-pupil area of 20 square feet rather than 30-35 square feet per pupil.

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- The extension of ten expiring programs (such as aid for the education of adults, Indians, women, and immigrants) and an overhaul of aid to bilingual education;

- Continuation of the current eligibility standards for Pell grants to needy college students through academic year 1986-1987;

- Scholarships to attract capable students into teaching and to keep good teachers in the profession;

- Aid for magnet schools in communities undergoing desegregation;

- Creation of a Federal institution dedicated to the study of peace and conflict resolution.

Congress rejected:

- An effort to revamp college student aid by putting more emphasis on student "self-help" in paying tuition bills;

- A broadly drawn program of school-improvement aid;

- Legislation to improve foreign language instruction;

- A significant and very costly expansion of student aid;

- A constitutional amendment allowing organized, recited prayer in public schools;

- Structuring the public school day so as to allow moments of silent prayer;

- Reversal of *Grove City College vs. Bell* (Supreme Court, February 28, 1984), which restricted the scope of nondiscrimination laws to the particular program or activity receiving Federal funds. □

Functional Schools Don't Just Happen

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School-building planners of the future must remember that critics persistently decry what they consider excessive outlays of money for education. Consequently, plan-

ners must examine as objectively as possible current practices in school building construction to determine whether economies can be effected.

However, school planners need to guard against being penny-wise and pound-foolish. The curriculum of the school system must determine the design of the educational plant. Efficiency in accomplishing the school's educational purpose must receive first consideration. If larger, more elaborate, and better equipped educational buildings are needed to conduct an efficient and effective educational program, then they must be provided. If, however, the educational purpose can be accomplished just as well, or better, in a more economical setting, then construction of larger, more expensive classrooms is indefensible.

If better teachers, better equipment, and better materials for instruction can be obtained through savings on school plant construction, then such savings must be made. One way of effecting optimum efficiency and economy in the future classroom may be found through a closer examination of the best and most functional utilization of classroom space. □

FOOTNOTES

¹ Stanton Leggett, C. William Brubaker, Aaron Cohodes, and Arthur S. Shapiro, *Planning Flexible Learning Places* (New York: McGraw-Hill, 1977).

² Bryce Perkins, "Team Teaching," *New Frontiers in Education*, Fred and Corrine Guggenheim, eds. (New York: Grune & Stratton, 1966).

³ Francis Keppel, *The Necessary Revolution in American Education* (New York: Harper and Row, 1966).

⁴ James A. van Zwoll, "A School Building Problem—Conserving Wealth to Improve Instruction," University of Maryland, 1960.

⁵ Charles L. Spain, Arthur B. Moehlman, and Fred W. Frostic, *The Public Elementary School Plant* (New York: Rand McNally and Co., 1930).

⁶ William C. Reavis, Parl R. Pierce, Edward H. Stullken, and Bertrand L. Smith, *Administering the Elementary School* (Englewood Cliffs, N.J.: Prentice-Hall, 1956), p. 417.

⁷ van Zwoll, James A., "Classroom Area Per Pupil," Paper presented at the meeting of the American Educational Research Association (Chicago, 1963). (Mimeographed.)

⁸ Kenneth Reid, *School Planning—The Architectural Record of a Decade* (New York: F. W. Dodge Corporation, 1951), p. 433.

⁹ Ralph C. Daniels, "Elementary School Class-

room Area Requirements—A Study of the Relationship of the Area Per Pupil to the Achievement, Activities, Social Interactions, and Participation in Discussion of the Pupils," Ed.D. Thesis, College of Education, University of Maryland, 1966, p. 9.

¹⁰ James A. van Zwoll, (Port Clyde, Maine, January 24, 1979), Interview.

¹¹ _____, "Classroom Area Per Pupil," p. 9.

¹² Lawrence D. Hervey, "A Survey of Classroom Space in a Selected Sample of Parochial and Private Elementary Schools," Master's Thesis, University of Maryland, 1959.

¹³ Richard G. Stottlemeyer, "Secondary School Classroom Space Requirements—A Study to Examine Relationships Between Gross Room Area Per Pupil and Academic Achievement," Doctoral Dissertation, University of Maryland, 1965.

¹⁴ Alphonse B. Gaudet, "An Experimental Exploration of the Relationship of Classroom Size to Pupil and Teacher Roles," Doctoral Dissertation, University of Maryland, 1965.

¹⁵ Daniels, *Op. cit.*

¹⁶ Max Rosenfeld, "Classroom Area Per Pupil and Discipline Problems: An Experimental Exploration of the Relationship of Classroom Size to Pupil Deviant Behavior and Its Management by Teachers," Doctoral Dissertation, University of Maryland, 1968.

Teacher Training

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that instructing large groups of students is time-efficient as well as effective. Teacher-education programs strive to provide actual classroom experiences that will strengthen and expand these skills.

On-the-Job Training

Teacher training should not—indeed, must not—end when the new teacher receives his or her diploma. In addition to good methods classes, every teacher needs the inspiration of well-conducted, meaningful in-service education provided on a regular basis.

Topics that could profitably be discussed during in-service sessions include:

Helping teachers overcome math phobia

Raising math scores on standardized achievement tests

Designing effective diagnostic classroom tests

The role of reading in elementary and secondary mathematics

Using computers in mathematics classes