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ABSTRACT

This paper describes findings of a study that integrated design patterns to illustrate prototypical school designs. The present work is part of a more comprehensive study conducted on the impact of school facilities on educational performance. The paper focuses on the third part of the study, which developed 27 design patterns to create integrated prototypical designs. It illustrates how these design patterns can be integrated to suggest a variety of prototypical school-design layouts. The 27 design patterns were organized into four hierarchical levels: (1) planning principles; (2) building organizing principles; (3) the character of individual spaces; and (4) critical technical details. The paper focuses on one of the prototypical plans based on a network of patterns--the team suite, or cluster of classrooms. The team suite is comprised of the following design patterns: modified open space, a flexible learning facility, small classrooms, a variety of learning centers, well-defined activity areas, table groups, nested classroom groupings, a portfolio process studio, a cluster of teacher offices, and indoor-outdoor transition spaces. Three figures and one table are included. (LMI)

Design Patterns for Educational Facilities: Translating Research into Prototypical School Designs[1]

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This paper reports on our work on integrating design patterns to illustrate prototypical school designs. This present work is part of a more comprehensive study conducted on the impact of school facilities on educational performance (Moore & Lackney, 1994). Initially, the study involved a qualitative meta-analysis of the findings in the empirical research literature on the impact of school buildings on educational performance (see Moore & Lackney, 1993). As a second part of the review, over one hundred innovative educational facilities from North America and Europe were analyzed. The third part of the study consisted of developing 27 design patterns which respond to the behavioral and social science literature, recent architectural trends, and the educational reform movement. Fourth, an ecological model was developed that brought some clarity to the issues (Lackney & Moore, 1994). The final part of the study involved developing integrated prototypical designs from the design patterns; this paper is a report on this final part of the study.

The objective of this presentation is to advocate a research-based approach to educational facility design. Our work has consisted of reviewing and interpreting empirical research and translating this research into design patterns. Here we illustrate how these design patterns can be integrated to suggest a variety of prototypical school design layouts.

Design Patterns

The first step in our research-based approach to educational facility design was to analyze and interpret the existing empirical, architectural, and educational reform literature on the relationship between school facilities and educational outcomes. From this analysis a set of concepts or principles emerged that contained explicit or implied physical components; we refer to these principles as design *patterns*. The concept of a pattern we borrow from Chris Alexander (Alexander et al, 1977) to describe the core of the solution to a problem that can be repeated over and over, but never in quite the same way. Design patterns can be thought of as working hypotheses or research-based design guidelines from which design decisions can be made with a greater degree of certainty.

We were able to generate a total of 27 patterns, organized into four hierarchical levels: (1) Planning Principles, (2) Building Organizing Principles, (3) The Character of Individual Spaces, and (4) Critical Technical Details. Figure 1 below presents the "origins and status" of all 27 patterns: first, disciplinary sources ("origins") that form the basis of each pattern are identified, and second, an overall confidence rating of the validity of each pattern is offered based on the strength of its current support from these three sources.

Pattern No. 8: The Team Suite/Cluster of Classrooms

These design patterns can be combined and translated into a series of prototypical plans. Each of the 27 design patterns can be integrated into any number of prototypical plans: campus plan, community forum, team suite, and house plan. This section will illustrate only one of these possible prototypical plans based on a network of patterns: the Team Suite or Cluster of Classrooms (Pattern #8).

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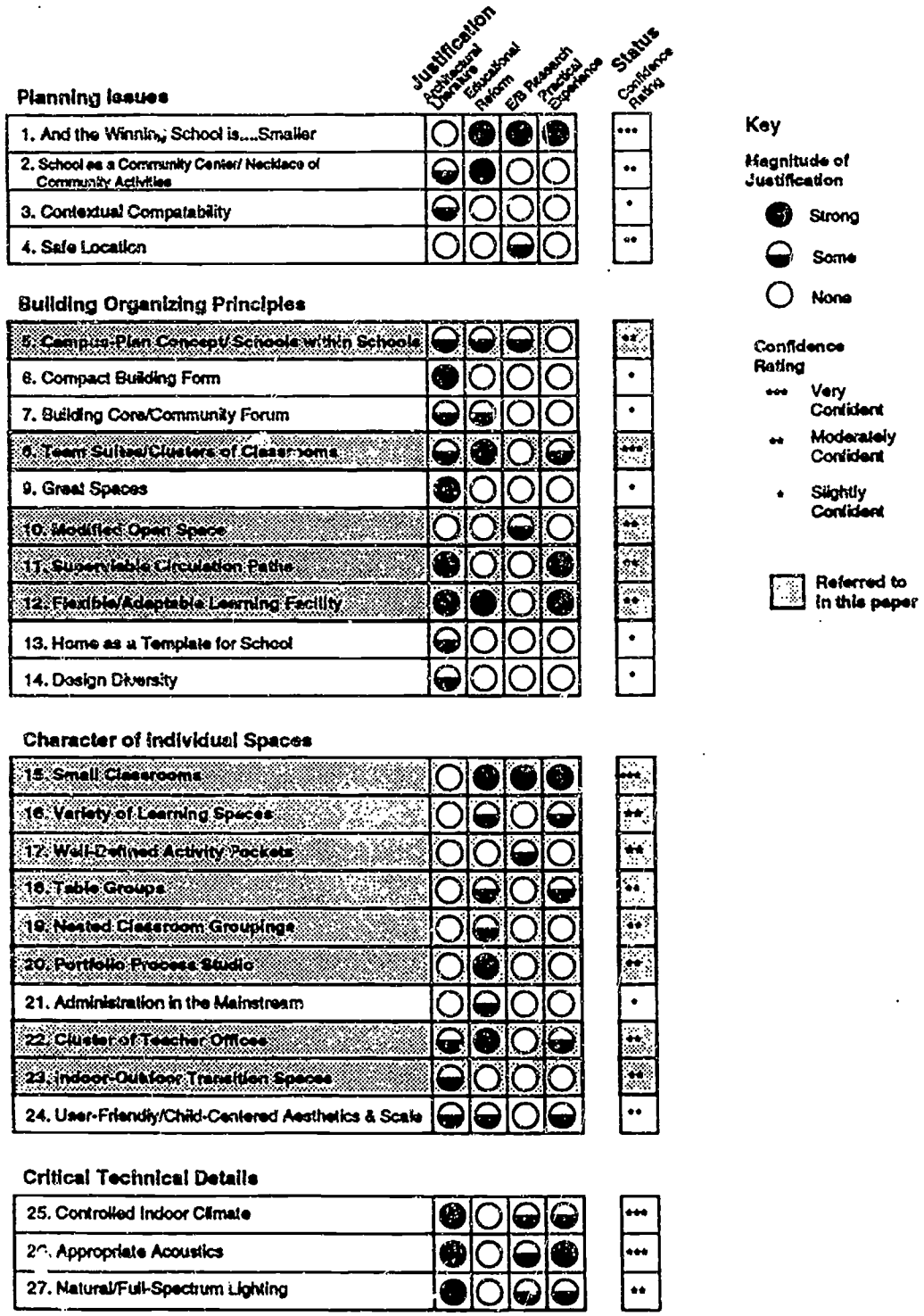

Figure 1. Patterns: Origins and Status

First, the Team Suite pattern can be conceived as being contained in a larger structure such as a Campus-Plan Concept or Schools within Schools (Pattern #5). The Campus-Plan Concept pattern can be translated physically into a decentralized building plan in which separated yet related schools-within-a-school act as independent houses each with their own common space and entrance resulting in the breaking down of the scale of the building. In this case, the Team Suite pattern, acting as a school-within-a-school, becomes a substructure of the larger Campus-Plan structure.

The Team Suite is a common educational reform trend sometimes called the a "classroom suite", a "self-contained classroom community" or a " pod school." The philosophy behind this reform idea and design pattern is that teachers and students together constitute a small community. Variations on this theme include cooperative learning, new versions of team teaching, Ted Sizer's notion of teachers as team coaches, and the school as a mirror of the emerging workplace. In one interpretation of this philosophy, the Koln-Holweide model (as described in Fiske, 1991; 103), teachers are divided into small, relatively autonomous teams of between six and eight, with each team being responsible for one group of students. The teams stay with their students from the fifth grade until tenth grade. In this layout, the school can accommodate different team/community philosophies. The Team Suite pattern physically manifests itself as a design prototype containing a series of small suites of interconnecting, inter-communicating classrooms and support facilities around central core functions (Figure 2).

As part of the New Schools for New York project (a collaborative effort between the Architectural League of New York and the Public Education Association), Strickland & Carson Associates' design for School Site Number 1 in the Bronx provided suites for an inner-city school including classrooms, lounge space, office space for teachers, lockers, private bathrooms, window seats, terraces, hallway display cases, and smaller seminar rooms (reported in Genervro, 1990).

Concurrently, the Team Suite pattern is comprised of a large number of embellishing patterns that collectively give shape and content to the notion of a cluster of classrooms. Table 1 provides a brief description of the ten patterns that can potentially comprise the Team Suite substructural pattern. Following the listing of patterns in Table 1, Figure 3 illustrates one of many possible prototypical plans for the Team Suite arising out of particular network of embellishing patterns.

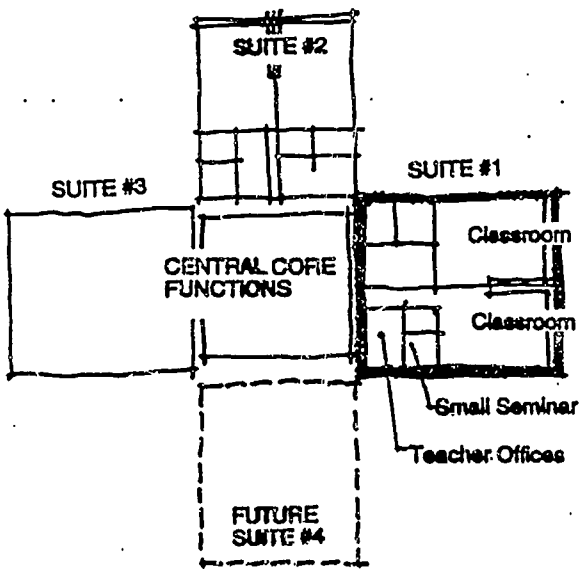

Figure 2. Team Suites/Clusters of Classrooms

Table 1. Patterns that Embellish the Team Suite Substructural Pattern

Design Patterns	Description
10. Modified Open Space	A type of space division that resolves the dilemma between open and closed plan types and allows the best of both extremes while minimizing the problems of both -- a mixture of several open areas with smaller, enclosed spaces.
12 Flexible/Adaptable Learning Facility	Flexible spaces, flexible classrooms of all types including project rooms and the "portfolio process studio."
15. Small Classrooms	Classrooms on the order of 20 or less have been advocated based on extensive empirical research.
16. Variety of Learning Centers	The creation of settings appropriate for learning activity structures -- a variety of learning/teaching areas throughout the classroom and/or school -- a prototypical elementary classroom may need three primary teaching areas: a flexible traditional main area for group reading and "seatwork," a "wet" area for occasional art or science, and a cozy corner, and a loft or window seat area for more quiet study or one-on-one teaching.
17. Well-Defined Activity Areas	Architecturally well-defined learning/activity settings--sound absorbing partitions, small areas for privacy, lecture pits, lofts, well-articulated activity nooks, etc.
18. Table Groups	Multi-age grouping, children working in cooperative groups with the teacher-as-coach and student-as-worker, students working in cooperative table groups.
19. Nested Classroom Groupings	Support for individual study and activity, for table groups, and for large-group instruction, all in the same "smart classroom."
20. Portfolio Process Studio	The provision of appropriate spaces for working on portfolios, and exhibiting them, including but not limited to A/V studio, dance and performance studio, individual project work space, large open project tables, a gallery to display work, and a staging area.
22. Cluster of Teacher Offices	Quality, private working space with telephones, fax machines, computer terminals, etc., all networked throughout the school and the district -- these offices clustered and sharing a common seminar space, meeting room, and/or staff back-stage.
23. Indoor-Outdoor Transition Spaces	Transitional spaces between indoors and out -- used as teaching/learning spaces -- elements of the building can reach out into outdoor spaces and create an additional space for class activities, a gently pitched roof with a wide "eyebrow" for undercover teaching in slightly inclement weather, a timber board walk beneath a fabric canopy to link classroom clusters and double as an external teaching area, shaded loggias formed at each end of the building that can be used as outdoor project spaces, etc.

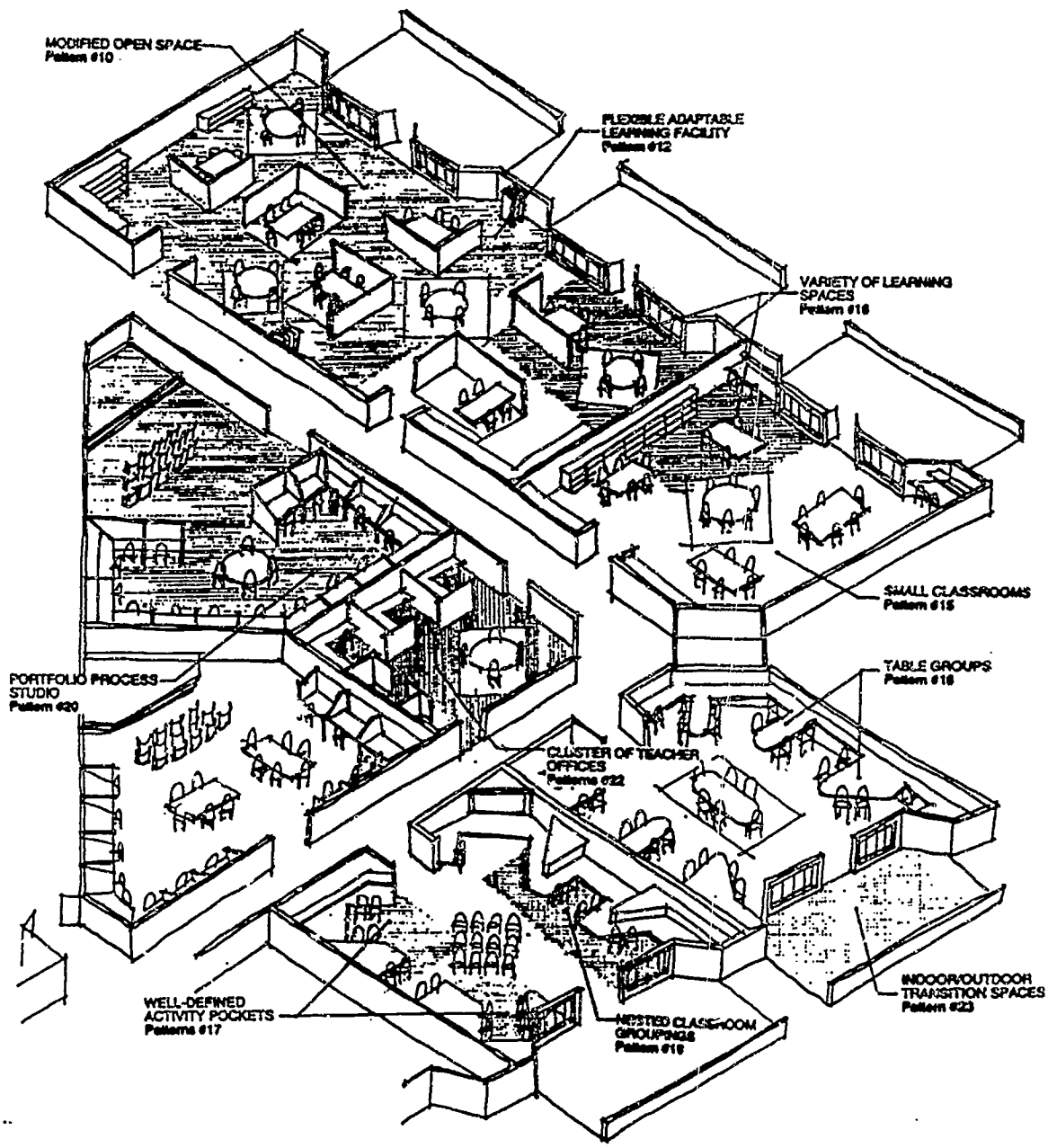

Figure 3. Integrated Prototypical Design for Team Suites/ Cluster of Classrooms Comprising Patterns #10, 12, 15, 16, 17, 18, 19, 20, 22 & 23.

Other embellishing patterns not included here could comprise the Team Suite substructural pattern if the design objectives suggested their inclusion in the overall network of patterns. For example, Pattern #11: Supervisable Circulation Paths might be required if a classroom setting including modified open space that does not appear to provide enough clear circulation paths that visually connect activities and classroom areas or allows for too many hidden corners or out-of-the-way spaces for children to hide from supervision. This illustration shows the complexity involved in balancing the advantages and disadvantages provided by patterns in relationship to the educational goals of a particular setting.

Conclusions

This paper has illustrated the complex hierarchical relationships that exist between a number of the twenty-seven design patterns we have developed based on the empirical, architectural, and educational reform literature. The example of the pattern Team Suite/Cluster of Classrooms illustrates the value of following a research-based approach to educational facility design in light of complex relationships between various design patterns. We believe that the development and use of design patterns and prototypical designs be a collaborative dialogue between researchers and practitioners from both the architectural and educational professions. Collaborative efforts illustrated by the successful New Schools for New York project will provide a forum for the discussion of prototypical designs based on empirical data arising out of both the architectural and the educational communities. As educational philosophies continue to change, many new patterns will arise that have not been suggested by either empirical, educational, or architectural literature. In this regard, educational and architectural researchers can provide the necessary empirical evidence for more effective design patterns for school facility designers.

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