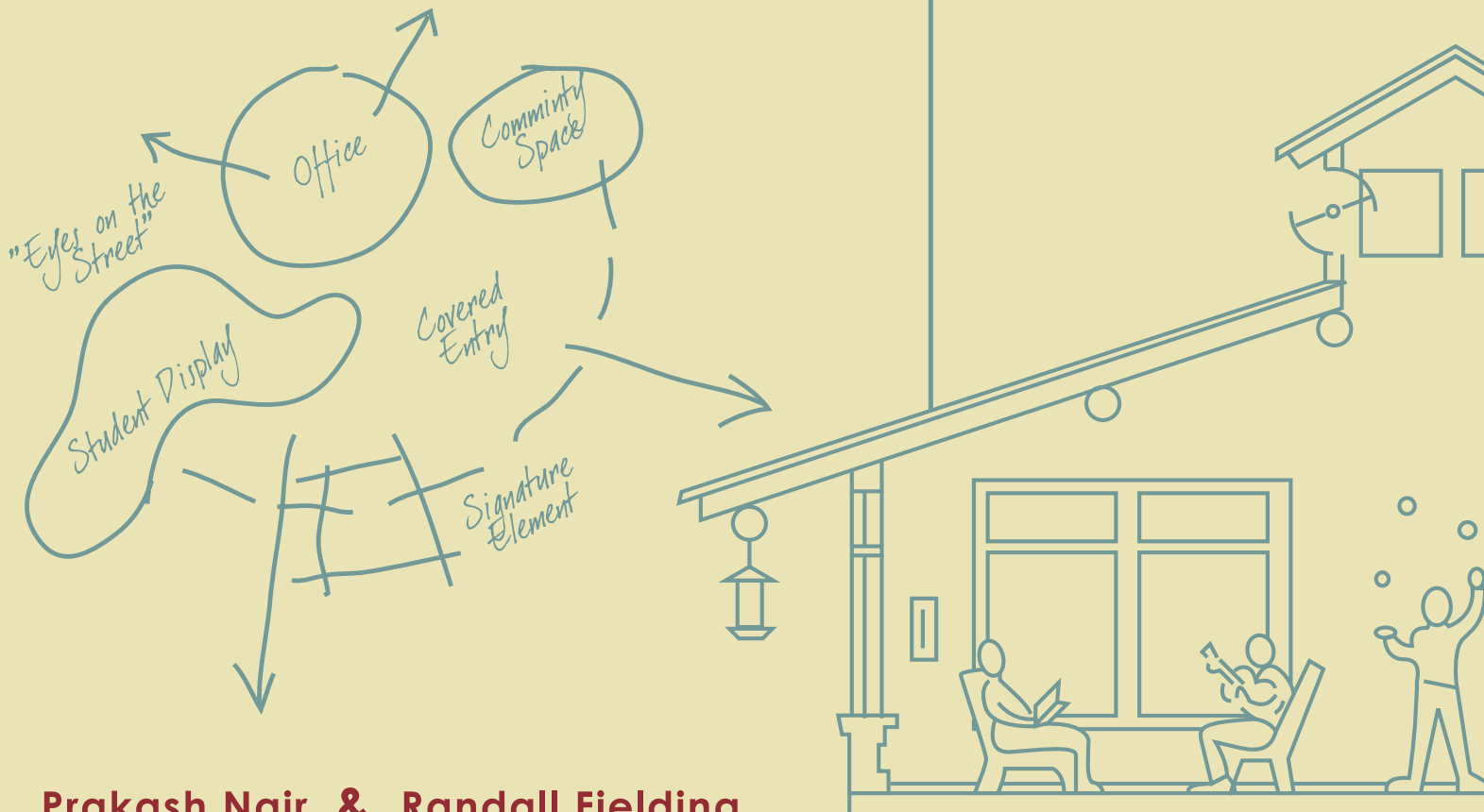


# The Language of School Design

## Design Patterns for 21st Century Schools



Prakash Nair & Randall Fielding

DesignShare

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THE LANGUAGE OF SCHOOL DESIGN: Design Patterns for 21st Century Schools

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## Introduction

### Inspired by Alexander

When Christopher Alexander wrote *A Pattern Language* more than 25 years ago, he approached architecture from a unique perspective. He looked at the real world of people plus the buildings and spaces they inhabited in order to understand the connections between the built environment and the human psyche. Focusing on architectural and landscape attributes that worked, on places that felt pleasant or were spiritually uplifting and to which people were attracted rather than turned off, Alexander was able to identify many spatial "patterns" that nourish the human communities they support.

Interestingly, the larger body of architectural work, in the period immediately following the publication of Alexander's ground-breaking book, does not appear to have affected the way we build our homes, our towns and cities. However, over time, Alexander's work has gained credibility as the ideas he presented have begun to enter the scientific realm of complexity theory, fractals and neural networks—disciplines on the cutting edge of science. The "connections" between the built environment and

healthy communities that Alexander was pointing out are now more readily apparent. Today, we know that human brains are actually hard-wired to understand and respond to patterns in all spheres of our life and, particularly, to those that exist within our built environments.

Our book, *The Language of School Design*, does not claim to be scientifically based. The book draws upon our own experience as school planners and the best practice of school design from over 20 countries, represented by hundreds of innovative school designs that we have published at [DesignShare.com](http://DesignShare.com).

### Why a Pattern Language for Schools?

We felt the need to develop a pattern language for schools for the simple reason that while Alexander's book is now beginning to influence the planning and design of healthy communities, transformation is painstakingly slow in the world of school design. Despite the fact that the educational establishment itself has embraced a number of innovative approaches over the years, architects often hear educators speak with a vocabulary reminiscent of their own

childhood experiences in school buildings designed for a different time.

Why do schools look the way they do? Why is there a chasm between widely acknowledged best practice principles and the actual design of a majority of school facilities? Why has the connection between learning research and educational structures been so difficult to repair? These are the questions that we have been grappling with over the past decade as school planners.

### **A Common Design Vocabulary**

From our own experience and from the research, we have begun to understand that one of the biggest roadblocks to innovation is the lack of a common design vocabulary that all school stakeholders can share. In other words, there is no quick and elegant fashion in which design ideas can be developed and tested in a way that truly involves all stakeholders.

Most of the larger school systems (and many of the smaller ones as well) rely on their own internal "quality control" methods to develop schools. But the inadvertent result of all this quality control is a lot of sameness and little innovation.

The climate in which schools are developed today, with heavy reliance on educational specifications, design guidelines, exemplars and prototypes, leaves little room for real creativity and innovation. Educational specifications create a school before it is created—design guidelines are too prescriptive (so that architects are often relegated to the role of assembling pieces instead of doing real design). Exemplars look good on paper or may have worked in certain specific circumstances,

but have little to do with the needs of particular communities; and most prototypes are about cookie-cutter schools that don't even pretend to be community specific. We firmly believe that schools need to grow from a shared vision. But we know that much can be lost in the translation of a written vision into built form. And so, we need a graphic pattern language to supplement the written words—a pattern language that is so simple that every participant in the planning process can not only understand it, but actually create their own patterns or easily amend ones developed by their design professionals. In this sense, our pattern language differs from Alexander's in that we wanted to create an actual, usable design vocabulary for schools as a living, changing thing—similar to the spoken and written language that changes as cultures grow and change—but one that everybody can use.

### **25 Patterns Are Only A Beginning**

We want to emphasize that we are not presenting these design patterns as a comprehensive vocabulary for school design. The 25 patterns contained here only *begin* to define the graphic language for the design of healthy and functional learning environments. To the extent possible, we have selected patterns that represent certain universal principles, though they are not to be used as a template or prototype of how any given element in a particular school should be designed.

School designers should look at these patterns as a starting point for developing their own patterns or modifying the ones provided here. Of course, in certain circumstances, some of these patterns will be usable without modification.

## Some Pattern Ideas That Need to Be Further Developed

The professionals who reviewed this book submitted many useful suggestions that have already been incorporated into this first edition. Some of these ideas need to be explored further, and to do this we are recruiting the book's future "authors"—the readers—to create new patterns that best represent these ideas. Here is a small sampling of the areas that will be developed in the next edition of *The Language of School Design*:

- To what extent do state standards and required curriculums dictate the manner in which school buildings are planned and designed?
- Do the facilities created as a result of such external educational forces help or hurt learning goals?
- How does the physical design of a school affect the social dynamics of the school community?

The last issue has been partially addressed via the various patterns in this book that encourage social learning. Some of the areas need to be looked at further, such as the way in which toilets can be designed and located to mitigate the problem of bullying. Other issues deal with the conditions that seem to attract particular groups of students to "territorialize" parts of the school campus and how these areas move back and forth between various age groups as they progress through school.

### Diagrammatic and Illustrative Patterns

Each of the 25 patterns (and their sub-patterns) in this book can be categorized as either diagrammatic or illustrative.

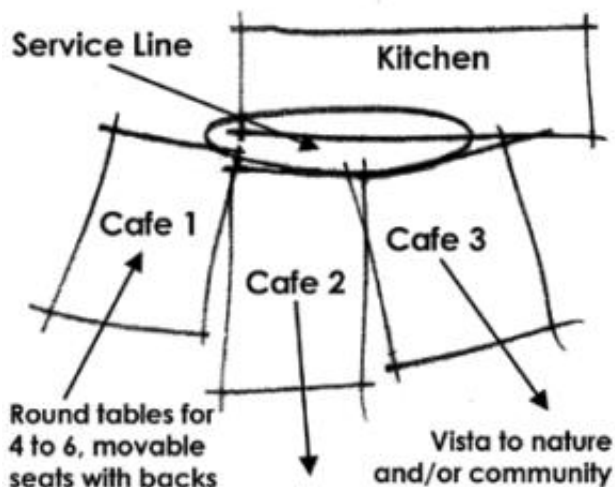


Figure I-1. Diagrammatic pattern for cafés at Goa International School, India. Planner: Fielding Nair International (FNI); Architect: FNI with Dennis Coelho and Suhasini Ayer.

**Diagrammatic Patterns:** A diagrammatic pattern is a rough sketch of a "big idea." In this sense, a diagrammatic pattern is somewhat generic and universal in scope. That doesn't mean a diagrammatic pattern will represent a spatial relationship that works in all cases, but it is intended to represent a particular philosophy of planning and design, more than the actual design of a particular school. See Figure I-1.

Diagrammatic patterns are useful early in the planning process as a graphic sounding board to gauge a client's general educational philosophy and design preferences. A diagrammatic pattern can also be created very quickly and "on-the-fly" to capture specific ideas during planning and community meetings. These kinds of early sketches often influence the final design.

**Illustrative Patterns:** Illustrative patterns are different from diagrammatic patterns in one important respect—they are more detailed. It is not unusual for an illustrative pattern to also be somewhat universal in scope. In general, the more detailed the illustration is, the

less universal its scope. If this is so, why bother with an illustrative pattern and can it even qualify as a pattern? The answer is yes. We believe that any illustration can be a "pattern" as long as it documents spatial relationships in a way that communicates the big idea. That is why diagrammatic patterns intended to first introduce a big idea often turn into illustrative patterns to flesh out that big idea. In Figure I-2 the illustrative pattern shows how the design pattern fits into the overall design process.

### How to Use the Pattern Language Method

Let us take a moment to introduce how exactly our Pattern Language

Method can help in the design process by looking at a specific example of its use. Figure I-2 shows the stages in the development of a cafeteria design for a school that was aided by the use of design patterns. This client originally started with the idea of building a typical large school "cafeteria." During the course of the discussion utilizing the Pattern Language Method, we were able to understand how the cafeteria should not only reinforce the school's desire to create "community," but also give a special identity to each of its Small Learning Communities. We understood that this could not be done without somehow breaking down the scale of the large cafeteria into smaller cafés. However, because of financial

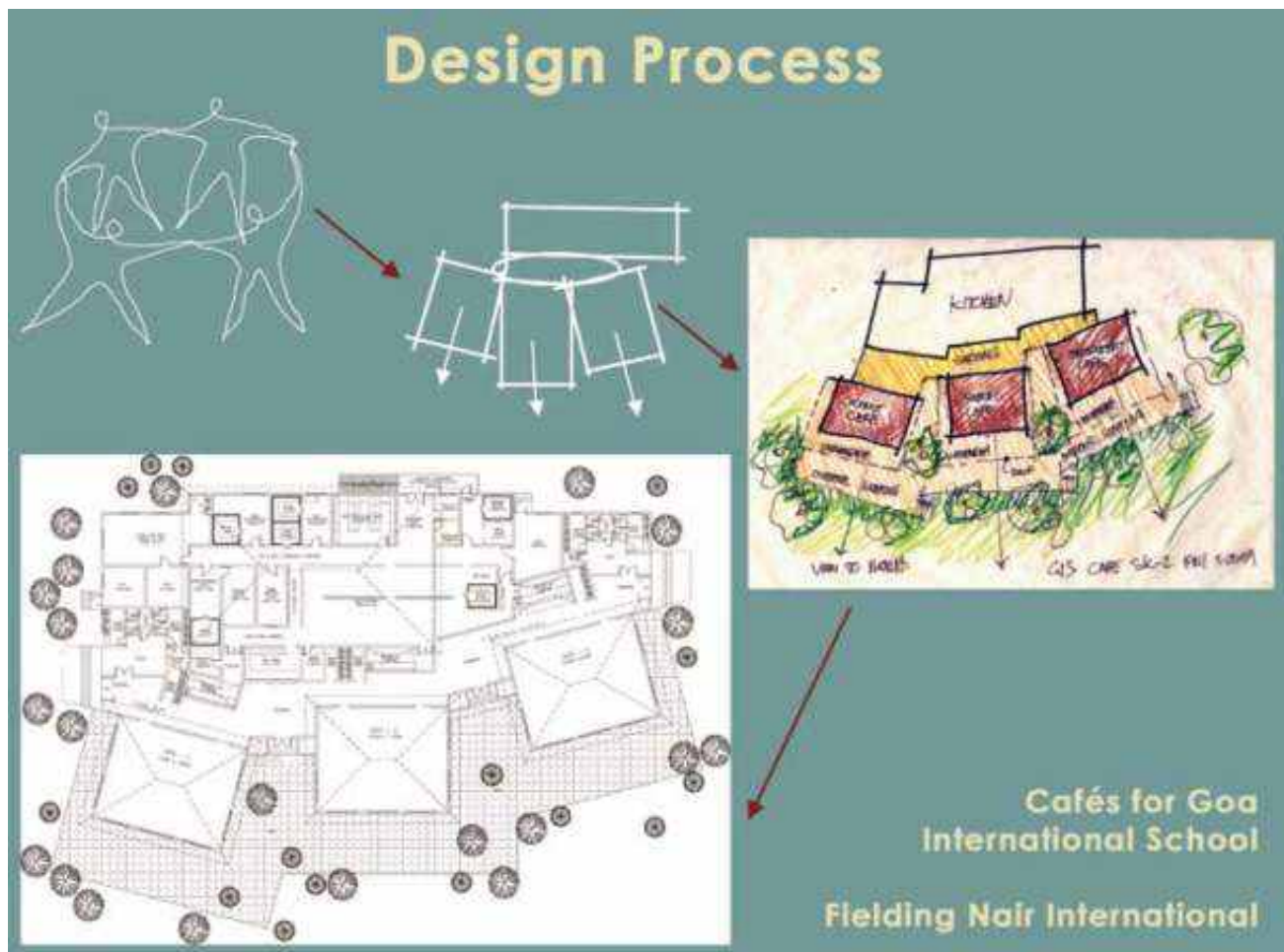


Figure I-2. Illustrative pattern for Goa International School shows how the Design Pattern fits into the overall design process.



constraints, we needed to service all the cafés utilizing one central kitchen.

These discussions led to a very rough penciled pattern showing how three separate cafés might be developed that could be serviced by one central kitchen (Figure I-1). Once the team agreed with this direction, a more illustrative pattern was developed by the planning team that allowed the architects to produce a scaled schematic design drawing (Figure I-2). Utilizing this system, we can break down the communication barriers to good design that often beset school architecture.

In Pattern #25: *Bringing It All Together* (Figures 25-1, 25-2, and 25-3), we look at another example—this time for a whole school. This is to demonstrate how the Pattern Language Method we are proposing is not only about the elements that make up a school, but also about effectively setting up the design for a whole campus.

Knowing its value as an important aid in the school planner's toolbox, we are interested in continuously expanding our graphic "vocabulary" and sharing the information with all those involved in the creation of schools and school facilities. We have created a special online interface at our website (<http://designshare.com/patterns>) to collect more graphic patterns from the school planning community based on their own experiences. Periodically, we will review and edit the patterns submitted and reissue this book in electronic and print form.

### **The Numbering System for Design Patterns**

Our *Language of School Design* starts with a look at 25 distinct "patterns," each

representing a distinct area of school planning and design. The patterns are numbered from 1 to 25. Within each identified area, there are potentially many different patterns or sub-patterns. These become associated with the original pattern. For example, we have many patterns under the primary learning area umbrella, the classroom in its many iterations, which is Pattern #1.

As we move forward and new patterns are added, we will determine first if the pattern belongs in one of the original 25 "categories" already established. If it does, we will add it to that category and give it its appropriate number from 1 to 25 plus an alphabetical suffix *a*, *b*, *c*, etc. On the other hand, if the pattern brings a new idea to the table, it will get its own number such as 26, 27 and so on.

The advantage to this system is that Pattern #1 will always be the place to go to for information about the primary learning area: classrooms, studios, Advisories and the like. Similarly, entrance features will always be part of Pattern #2, so people can quickly refer to Pattern #2 for information about entrances, or for example, to Pattern #23 for sustainable design, no matter which edition of the book they have.

With far less investment of money and effort than the traditional system, where designers and school stakeholders do not share a common language of school design, the Pattern Language Method can help build consensus quickly, and create superior designs.

## Enriching the Four Realms of Human Experience

It is clear that most school architecture tends to look at spaces in a linear way—that means we first decide what a space would be used for and then we design the space for that activity. This kind of thinking ignores the complexity and research about the human brain and human experience, resulting in the design of static spaces that inhibit learning.

The reality is that the design of learning environments is a complex assignment. While the solutions may be simple or elegant, they can almost never be "simplistic." We need to understand the complexity of the human experience as noted above in order to understand what "learning" is about. We also need to recognize that it is almost impossible to solve a design problem unidimensionally. Everything we do as designers impacts the users of the space at many different levels.

What exactly in the whole range of human experiences does The Pattern Language Method encompass? In response, we can say that it deals with four major and simultaneous realms of human experience—spatial, psychological, physiological and behavioral. Each of these realms is

characterized by multiple "attributes." See Table I-1.

What is fascinating about this list is the obvious interconnectedness of the attributes across the four realms and the fact that the interconnectedness is non-linear. That means it is nearly impossible to identify simple cause-and-effect relationships between specific attributes that would hold true always. These relationships are always contextual, but they are far from being outside our ability to control. For example, research tells us that as humans our sense of sight (physiological realm) is a major emotional (psychological realm) trigger. We also know that our emotions can elicit a physical response (behavioral realm) such as laughter when we are happy, facilitated to a lesser or greater degree by the environment (spatial realm).

Let us look, for example, at "Light on Two Sides" in the original *A Pattern Language* by Christopher Alexander, which advocates having daylight penetrate a room from more than one direction. The purpose is to reduce stark contrasts that characterize rooms with only one window. Of course, if the problem were simply one of lighting a

Table I-1. The four realms of human experience and their corresponding attributes.

**Realms of Human Experience Within the Purview of School Planning and Design Attributes**

<b>Spatial</b>	Intimate, Open, Bright, Closed, Active, Quiet, Connected to Nature, Monumental, Technological
<b>Psychological</b>	Soothing, Safe, Awe-Inspiring, Joyful, Playful, Stimulating, Creative, Encouraging Reflection, Spiritually Uplifting, Creating a Sense of Community
<b>Physiological</b>	Warm, Cool, Cozy, Breezy, Healthy, Aromatic, Textured, Visually Pleasing
<b>Behavioral</b>	Independent Study, Collaborative Work, Team Work, Physical Fitness Activity, Research, Writing, Reading, Computer Work, Singing, Dancing, Performing, Presenting, Large Group Work, Communing With Nature, Designing, Building, Teaching, Relaxing, Reflecting, Playing

given space, it could be accomplished with one window or even with adequate artificial light but that would miss Alexander's point, which goes to the heart of how we as humans experience our environment.

Going beyond individual patterns and focusing on how they work together, Alexander likes to refer to a building's functional complexity using such words as "dense" and "profound." He compares a well-designed building to poetry as opposed to prose, because the former can be understood at many different levels that go beyond the meaning of the individual words. In the same way, a good building can either "string together patterns" without any real coherence or assemble them to create poetry in design form.

This is the fundamental thesis behind the Pattern Language Method advocated by Alexander and by us in this book;

that there are certain recognizable "patterns" that define healthy spatial relationships both at a micro and macro level. Unlike Alexander's ambitious work which encompasses human environments at every scale, we have limited our focus to the design of learning environments. However, we acknowledge that the learning environment is actually nothing more than one piece of a larger pattern and that good planning requires that each piece be respectful of the overall patterns for communities and towns that the original *A Pattern Language* identifies. In this sense at least, it is really impossible to ignore the larger context in which a learning community is situated. We have addressed this in a limited way in Pattern #22, *Connected to the Community*, but we strongly urge our readers to read Alexander's *A Pattern Language* for a treatise on the larger spatial patterns in our communities, towns and cities.

To pass the test and qualify as a "pattern," there has to be a certain universality to its application. A good example is Pattern #12, *Local Signature*, which cites three extremely diverse examples from Perth, Western Australia, from Goa, India and from Bridgehampton New York. Even though the examples themselves would seem to have nothing in common, the common human experience they seek to evoke ties them together within one "pattern."

The Pattern Language Method is a sensible way to provide room for these various facets of our essential natures to be stimulated, while at the same time allowing for the wide range of human interests and behavioral tendencies to co-exist peacefully. An example of how the four realms can be made to work in practice is the placement of an art room with natural lighting and a landscape view (physiological and spatial realms) intended to evoke a desired creative response (behavioral realm) by ensuring a suitable peaceful and reflective frame of mind (psychological realm). The ability to rearrange the room so that different persons can organize themselves at different times of the day for different artistic activities makes the design more robust. Our desire for flexibility must not supercede our primary intent, which is to positively manage the complex relationship within the four realms in order to create an environment conducive to artistic endeavors.

It is also clear from the above discussion that there is a certain synergy within the patterns themselves—a point we touched upon earlier. The above example for the design of an art room borrows ideas from various patterns in the book entitled: *Daylighting, Indoor–Outdoor Connection, Student Display Space, Indoor–Outdoor Vistas and Art, Music and Performance*.

A school, or any learning environment for that matter, in its totality, represents a very complex organization, but one that can usually also be represented in the form of a "pattern." An example of this is the *"Bringing It All Together"*, Pattern #25. The larger pattern will only make sense, however, when its sub-groupings are also recognized as complete "systems," themselves deserving to be represented as patterns.

While we are only listing the positive attributes of the four major realms of human experience, many attributes have a paired negative attribute as well, that we as school designers don't want to trigger via the design we create. Examples of negative attributes would be claustrophobic, stale, gloomy, drafty, dysfunctional, depressing, scary, inflexible, uncomfortable, banal, and so on.

Obviously, the permutations and combinations by which the various positive attributes can come together are almost infinite and that is why healthy "patterns" are important to identify. The patterns included in this book have been developed over time and are based upon our experience with spatial relationships that are functional at a very fundamental human level. These patterns respect the great complexity of human needs that vary not only with time and the context in which people operate, but also from person to person.

Beyond the curriculums and tests that define so much of what school is all about, it is ultimately our ability to enrich the four realms of human experience noted above that will determine how well we have done our work as school planners, designers and as members of a learning community.

## **The 25 Patterns**

We have selected the following 25 school design patterns because they represent a fairly complete range of the various design principles that define best practice. It is important to stress that dozens of variations of each diagram we have provided are possible. The number of diagrams that can be done is only limited by the school planning team's imagination. And yet, each diagram included in this book embodies certain universal principles—and the principles themselves are less likely to change from site to site.

1. Classrooms, Learning Studios, Advisories and Small Learning Communities
2. Welcoming Entry
3. Student Display Space
4. Home Base and Individual Storage
5. Science Labs, Arts Labs and Life Skills Areas
6. Art, Music and Performance
7. Physical Fitness
8. Casual Eating Areas
9. Transparency
10. Interior and Exterior Vistas
11. Dispersed Technology
12. Indoor–Outdoor Connection
13. Soft Seating
14. Flexible Spaces
15. Campfire Space
16. Watering Hole Space
17. Cave Space
18. Design for Multiple Intelligences
19. Daylighting
20. Natural Ventilation
21. Full Spectrum Lighting
22. Sustainable Elements and School as 3D Textbook
23. Local Signature
24. Connected to the Community
25. Bringing It All Together

## The Pattern Language Method

The 25 "starter" patterns in this book have been ordered into six categories as follows:

1. Parts of the Whole
2. Spatial Quality
3. Brain-Based
4. High Performance
5. Community Connected
6. Higher Order

We talked earlier about interconnect- edness of the four realms of human experience that healthy patterns try to balance. A great deal of interconnect- edness of patterns also occurs across the six areas listed above as shown in Table I-2.

Individual patterns may themselves have qualities that qualify them for consideration under more than one category; however, we have tried to identify each pattern under the one category that describes its purpose most clearly. In only two cases have we placed a pattern under more than one category; and in these cases, we have identified the primary category under which each one belongs. (Pattern #1, dealing with classrooms and Small Learning Communities, is primarily classified as category one, Parts of the

Whole, but also fits the description of category six, Higher Order. Pattern #2, Welcoming Entry, is primarily classified as category one, Parts of the Whole, but also fits the description of category # 5, Community Connected.)

We expect that all future patterns will fall into one of the above six categories though we are open to considering the inclusion of additional categories should we discover a school design pattern that does not fit the description of the above categories as follows:

*Parts of the Whole:* These are patterns that describe specific functional areas of a school. The first 8 patterns presented in this book starting with classrooms and Learning Studios and ending with Casual Eating Areas look individually at several key parts of the whole school—thus the term "parts of the whole." However, not every school will contain all the parts we have discussed under Pattern Numbers 1 through 8. By the same token, it is possible that we have not listed every functional area that a school might contain. Many specialty academies contain highly customized spaces designed to meet particular functional needs. For example, the Center for Advanced Research and Technology

(CART) in Clovis, California contains a Forensics Lab whose requirements may only be partially captured by the patterns in this book.

*Spatial Quality:* These are patterns that describe the quality of a given space or spaces and cut across functional areas. Transparency and flexibility, for example, are spatial qualities that apply to several of the other patterns.

*Brain-Based:* The primary facet of a brain-based pattern is that it responds to some particular aspect of brain-based research. Patterns in this category deal with the design of spaces that stimulate the brain in ways that are beneficial to learning and overall human development. The four patterns listed under this category are important to consider in the design of any and all parts of the school and relate again to the concept of interconnectedness.

*High Performance:* High Performance is a term that applies to the efficient operation of the building, as well as the way in which it is designed to get the best "performance" from its occupants by providing a healthy, safe and cheerful environment. These are patterns that highlight a building's connection with nature, its sustainable qualities, and the opportunities that are available to translate the way it is put together into self-evident learning tools—thus the term, "3D textbook."

*Community Connected:* There is ample evidence that schools that are integral parts of their communities work better. Not only are students of community schools more likely to get a better education, but community schools also serve to strengthen social ties and build economic value for the neighborhood as a whole. But Community Connections as

a pattern goes beyond making schools into community icons; it involves locating the school in a place that allows the students to get at least a part of their education by participating in activities within the community and outside the school building. A school can thus be "connected" to the community by having students take part in community service assignments, by working at local businesses, corporations and institutions, and by utilizing the resources of existing community facilities such as the local YMCA or library.

*Higher Order:* We define a Higher Order pattern as one which encompasses other patterns within it. The most obvious example is Pattern #25—Bringing It All Together. This is a pattern that shows how an entire school might be arranged and, therefore, includes various components that can themselves be represented as patterns. At a smaller scale, Pattern #1 also qualifies as a Higher Order Pattern because its sub-patterns are actually combinations of simpler concepts that are put together using stand-alone elements like the Learning Studio and the Advisory.

Table I-2. Classification of patterns.

Pattern #	Description	Pattern Type					
		Parts of the Whole	Spatial Quality	Brain-Based	High Performance	Community Connected	Higher Order
1	Classrooms, Learning Studios, Advisories and Small Learning Communities	<b>X</b>					X
2	Welcoming Entry	<b>X</b>				X	
3	Student Display Space	<b>X</b>					
4	Home Base and Individual Storage	<b>X</b>					
5	Science Labs, Arts Labs and Life Skills Areas	<b>X</b>					
6	Art, Music and Performance	<b>X</b>					
7	Physical Fitness	<b>X</b>					
8	Casual Eating Areas	<b>X</b>					
9	Transparency		<b>X</b>				
10	Interior and Exterior Vistas		<b>X</b>				
11	Dispersed Technology		<b>X</b>				
12	Indoor/Outdoor Connection		<b>X</b>				
13	Soft Seating		<b>X</b>				
14	Flexible Spaces		<b>X</b>				
15	Campfire Space			<b>X</b>			
16	Watering Hole Space			<b>X</b>			
17	Cave Space			<b>X</b>			
18	Design for Multiple Intelligences			<b>X</b>			
19	Daylighting				<b>X</b>		
20	Natural Ventilation				<b>X</b>		
21	Full Spectrum Lighting				<b>X</b>		
22	Sustainable Elements and School as 3D Textbook				<b>X</b>		
23	Local Signature					<b>X</b>	
24	Connected to the Community					<b>X</b>	
25	Bringing It All Together						<b>X</b>

\* Where a Pattern is listed under more than one category, then the bold-faced "X" indicates that pattern's primary classification.



Design Pattern #1

## Classrooms, Learning Studios, Advisories and Small Learning Communities

No book about school design would be complete without a discussion of the "classroom" and what this space might look like in tomorrow's school. In fact, it is legitimate to ask if the classroom should continue to reign as the primary building block of a school as it undoubtedly does today.

Before we can talk about design, it is valuable to take another look at what the classroom represents. The classroom is the most visible symbol of an educational philosophy. It is a philosophy that starts with the assumption that a pre-determined number of students will all learn the same thing at the same time from the same person in the same way in the same place for several hours each day.

### Cells-and-Bells (Ford) Model

A classroom's simplistic design also assumes that the significant part of a student's learning occurs in the transmission of knowledge from the teacher to the student in a somewhat linear fashion. A 750 square-foot space with 25 student armchair-tablet desks and a teacher's desk at the front of the room makes eminent sense if this is,

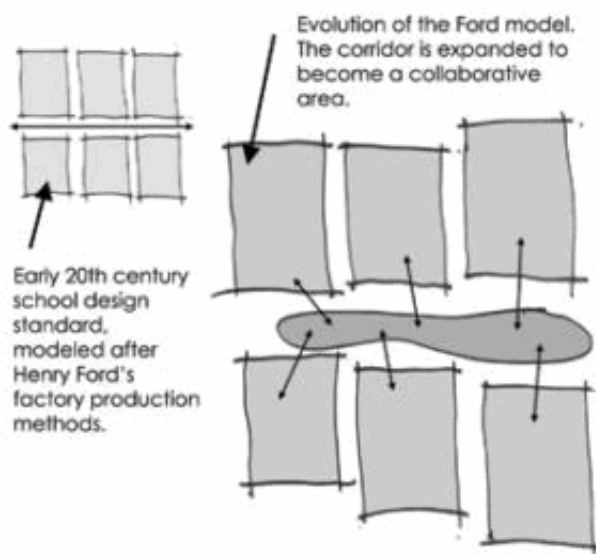


Figure 1-1. Design Patterns #1 and #1a : Traditional Plan and Ford Model Evolution.

indeed, what learning is all about. And how are those four computers sitting in the back of the room being used? They become additional learning resources, like textbooks, but do not change the essential model of the teacher firmly in command of the students under her "supervision" and active tutelage.

Under the original classroom-based model of a school, it made sense to regiment several classrooms next to each other and place them on long corridors that could be easily supervised. This was efficient from the standpoint of space and provided the adults with the most "control," since students leaving classrooms had nowhere to go but into the easily-supervised corridors from where they could move to the "other" learning spaces like science labs and art

rooms—also preferably set up along a double-loaded corridor.

The classroom model worked best from a control standpoint if the day itself could be broken down into neat little segments (45 minutes being the preferred period after which one activity would shut down and another would begin) and if the segmentation could be announced by bells that, over time, literally programmed the students to switch gears on command. Thus the term "cells and bells" was born. The vast majority of school buildings are in fact cells-and-bells models. For illustrative purposes only (in other words, we are not suggesting that this is a workable model for 21st century schools), we start, therefore, with Pattern #1—the early 20th century cells-and-bells pattern in which several regularly shaped classrooms are aligned along a double-loaded corridor.

### Ford Model Evolution

Another way of looking at the traditional classroom model is to equate it to a factory or production model in which the philosophy of the assembly line with its inherent efficiencies dictates the look and feel of the school. But by tinkering with this model, we can amend it somewhat to create an expanded corridor. See Figure 1-1.

An expanded main central corridor can also satisfy the need for social learning, by slightly changing the dynamic of the control model and making the school design more "progressive." Done well, an expanded corridor could function as a "Learning Street" though we have not seen any Ford Model Evolution plans done well enough to qualify as Learning Streets. For a more complete discussion of Learning Streets, please see the discussion in the essay, *The*

*Great Learning Street Debate* at the end of this book.

Another simple fix to the cells-and-bells model is the installation of operable walls between two classrooms on either side of the corridor. This allows greater flexibility in the way the overall space is utilized and also permits two teachers to collaborate and "team-teach."

Taking this one step further, some part of the corridor walls along the classrooms could be glazed to allow in natural daylight and also create "Transparency" which is another important design principle in new paradigm schools (see Design Pattern #9).

Taking the development of the double-loaded model even farther, sometimes referred to as the "finger plan," the pattern in Figure 1-2 shows smaller groupings of classrooms, six to eight at the most, pulled away from the main corridor. In this arrangement, the classroom cluster becomes a destination and not part of the larger thoroughfare. The finger plan has an added benefit in that it opens up the opportunity to make the main circulation spine into a Learning Street.

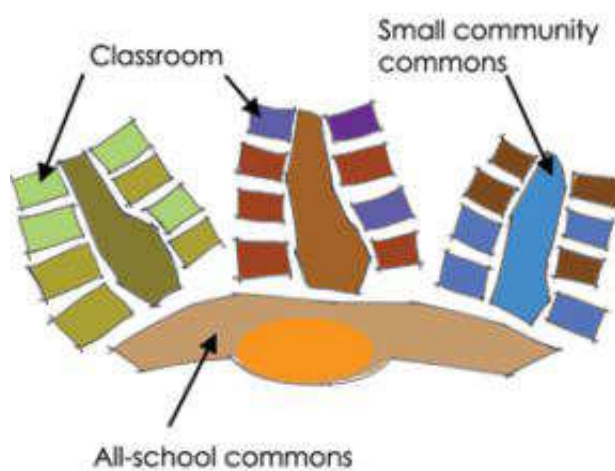


Figure 1-2. Design Pattern #1b : Finger Plan.

While it is a simple departure from the traditional corridor model, the finger plan model can have significant psychological benefits for students who are now better able to define their "Home Base" and thus take ownership for it. In order for these benefits to be fully realized, each cluster of rooms should be differentiated from the remaining clusters so that it has its own unique identity. This can be accomplished by giving each wing a different architectural character, changing color schemes, providing different options for display of student work and so on. In the end, however, classroom clusters within a simple finger plan may not qualify as a Small Learning Community because it lacks various common elements beyond classrooms that make each finger self-contained. We will look later at concepts that take the finger plan to the next level in order to create Small Learning Communities or SLCs.

First, however, let us look at the reasons for departing from the traditional model of school and toward a new 21st century model.

We now have abundant evidence from the frontiers of brain-based research that learning is not linear, but holistic, and that it is not uni-dimensional but multi-faceted. As we move into the post knowledge economy, we should be looking beyond the "knowledge worker" who is now a global commodity. Our most valuable export as a country will be creativity and innovation and these skills are not developed in the cells-and-bells model of school.

Under the new learning paradigm, we are looking at a model where different students (of varying ages) learn different things from different people in different

places in different ways and at different times.

Clearly, it is hard to reconcile the old and new models of school. The spaces set up for the old paradigm would be extremely difficult to tailor so that they function well for the new model.

To what extent such change may or may not be possible will vary from school building to school building and will depend upon how many of the following modalities of learning can be supported by the physical spaces. By looking at existing or proposed school designs with this list in mind, it will be easier to gauge their suitability to serve 21<sup>st</sup> century learning needs.

### **18 Learning Modalities**

The 18 Learning Modalities (this may not be a complete list) that the physical school must support are:

1. Independent study
2. Peer tutoring
3. Team collaborative work in small and mid-size groups (2–6 students)
4. One-on-one learning with the teacher
5. Lecture format with the teacher or outside expert at center stage
6. Project-based learning
7. Technology-based learning with mobile computers
8. Distance learning
9. Research via the Internet with wireless networking
10. Student presentations
11. Performance and music-based learning

1- It is important to remember that these learning modalities do not all need to be supported under one roof since some schools may have auxiliary or community facilities that are brought into play to augment school facilities.

12. Seminar-style instruction
13. Community service learning
14. Naturalist learning
15. Social/emotional learning
16. Art-based learning
17. Storytelling (floor seating)
18. Learning by building—hands on learning

A traditional cells-and-bells design will come up short against the above list because it is primarily set up for the lecture format. In Figures 1-1 and 1-2, we see that the traditional model can be pushed so that at least some of the new learning modalities can be accommodated.

This does not preclude the need to ask: Is the classroom obsolete? At some pure level, the answer to that question would be yes. But at a more practical level, we have to accept the reality that there are millions of classrooms already built in this country with thousands being added constantly.

### The Learning Studio

Given that the "classroom" itself will continue in some iteration into the



Figure 1-3. Exterior of L-shaped classrooms, Crow Island School in Winnetka IL. One of the first schools to feature the L-shaped Learning Studio. Architect: Perkins, Wheeler & Will, and Saarinen.

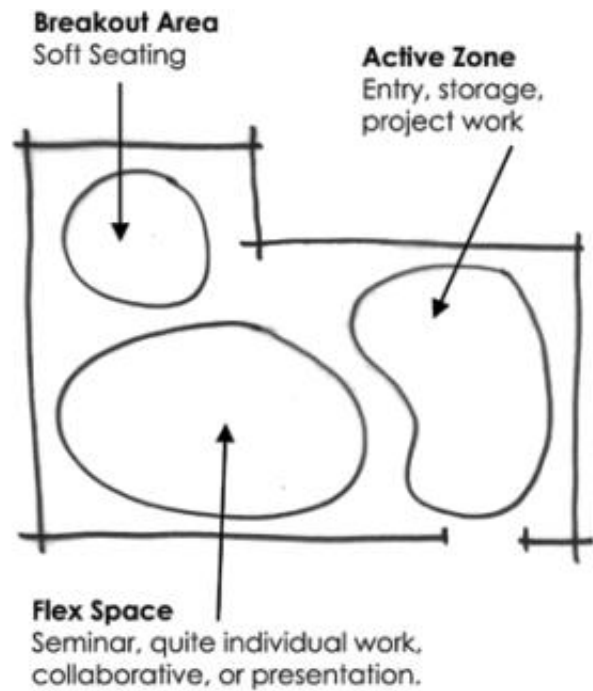


Figure 1-4. Design Pattern #1c: Learning Studio.

foreseeable future, let us look at design patterns where the cells-and-bells model is amended so that the classroom goes from a rectangular box to a more flexible "Learning Studio." The term Learning Studio is sometimes used to refer to an L-shaped classroom which is, actually, not a new idea. One of the earliest schools featuring L-shaped classrooms configured like Learning Studios is the Crow Island School in Winnetka, Illinois built in 1940—Figure 1-3. Today, 65 years since its opening, the architecture of the Crow Island School remains relevant—more so even than many of the schools being built today. In his article, "The L-Shaped Classroom—A Pattern for Promoting Learning," Peter Lippman makes a strong connection between the shape of the classroom and its ability to function as a Learning Studio with multiple activity centers.

Figure 1-4 shows the characteristics of a Learning Studio and Figure 1-5 shows that two Learning Studios can be arranged to form a "Learning Suite." This is further described by two floor plans. The first

illustrates one application of a Learning Studio. Figure 1-6 shows the plan for an Advanced Learning Module—which is a new generation of modular classrooms and schools now under development to meet temporary school needs. This irregular plan creates breakout spaces and flexible learning zones that support a significant number of the learning modalities from the above list.

### The Learning Suite

The second plan shows how a Learning Suite might look. Figure 1-7 shows a plan prepared for East Side High School in Newark, NJ and illustrates how two Learning Studios can be combined to create a Learning Suite. It illustrates how a Learning Studio-based plan can be quite "rich" as far as activities go. East Side's Learning Studios are ideal for project-based learning. The two Learning Studios create a Learning Suite

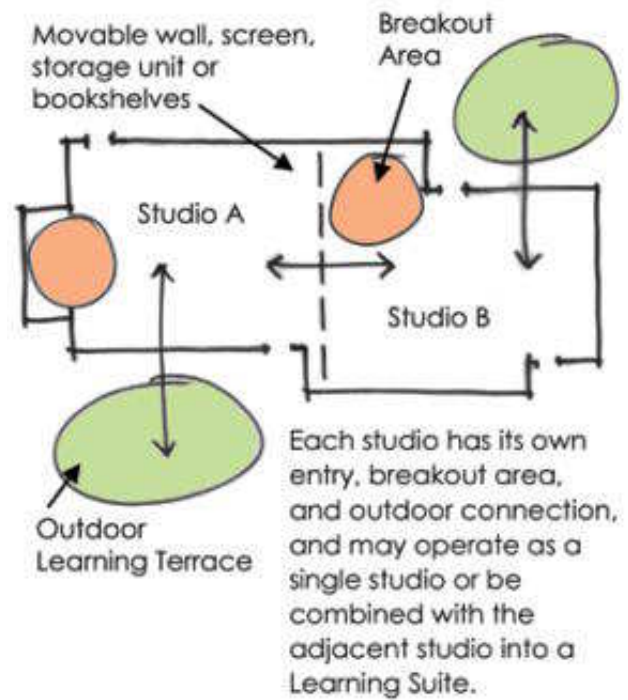


Figure 1-5. Design Pattern #1d: Learning Suite.

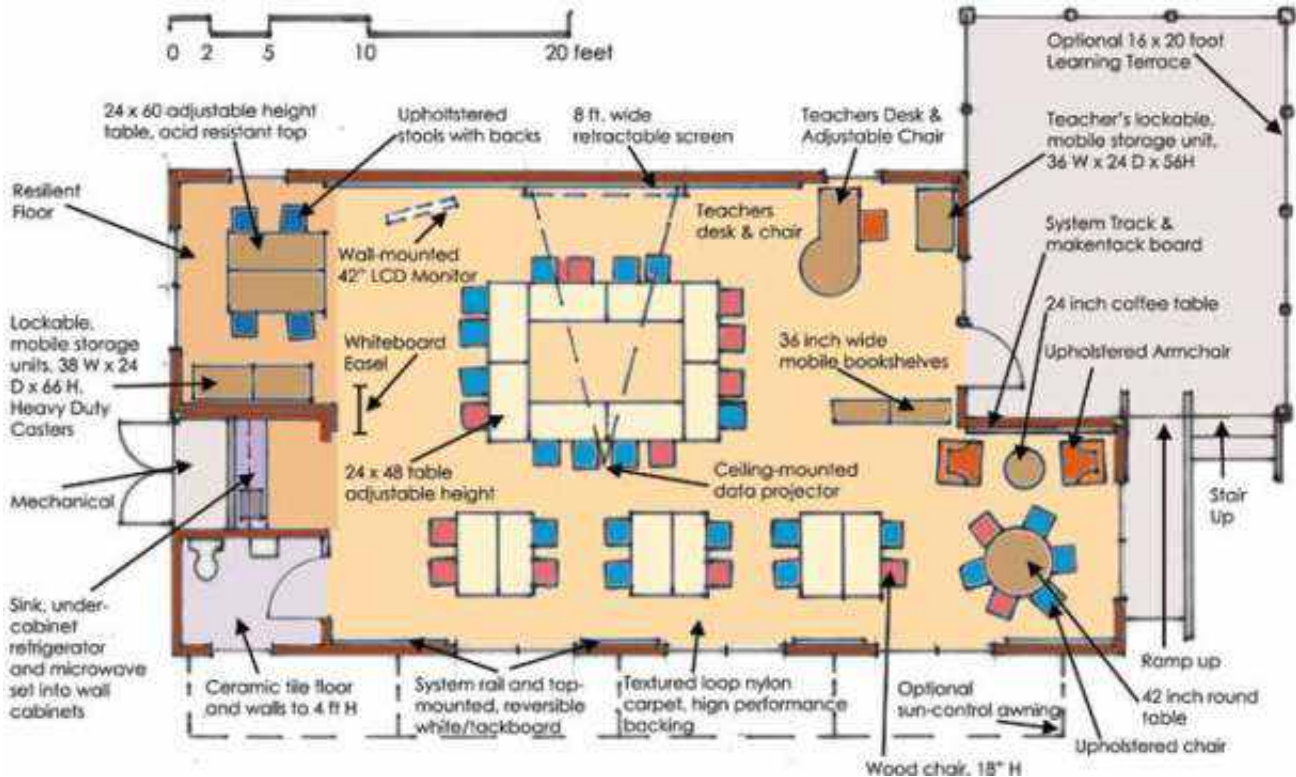


Figure 1-6. Learning Studio-based design for Advanced Learning Environment Solutions, Inc. Planning and Design: Fielding Nair International for Deployables, LLC.

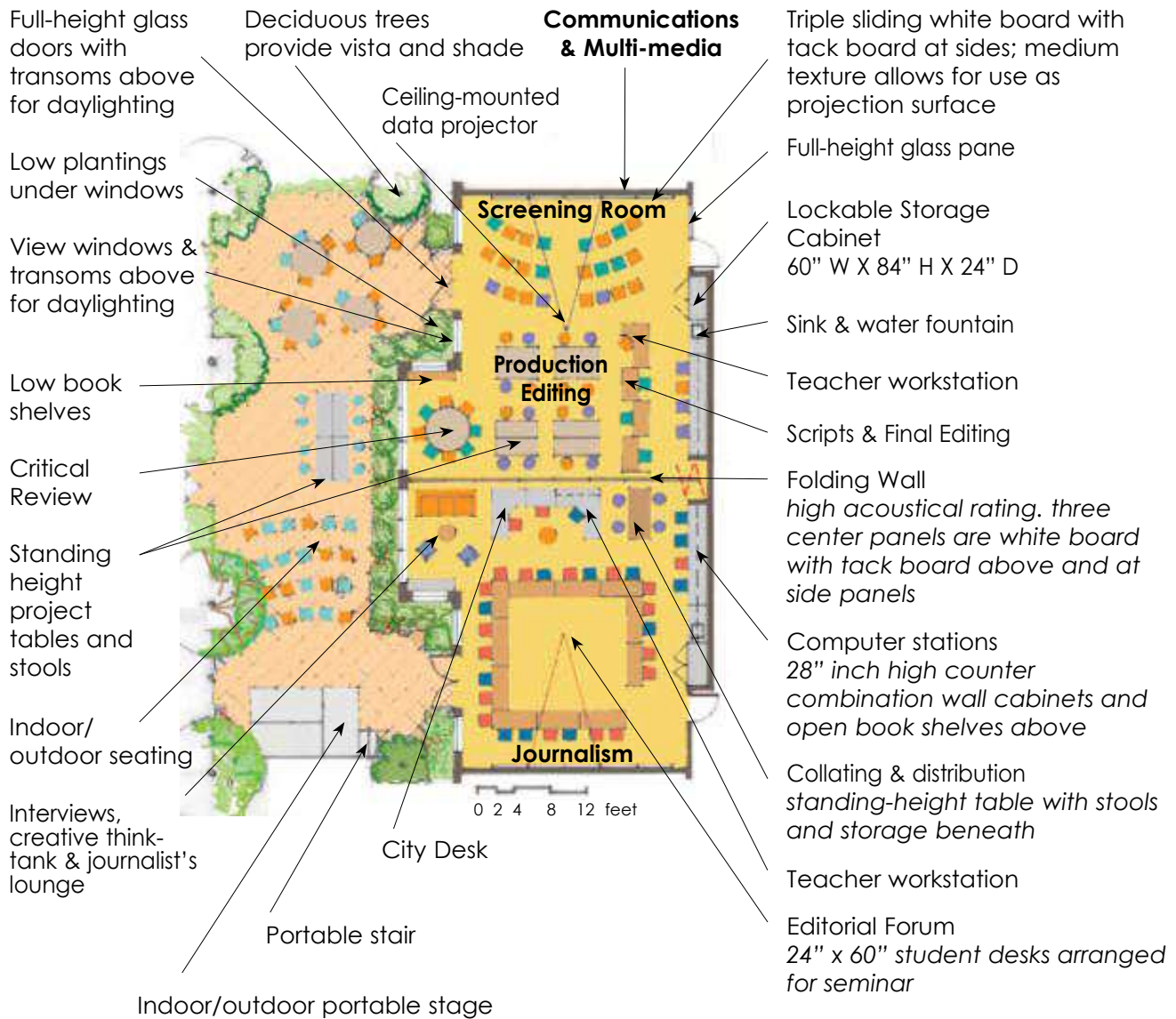


Figure 1-7. Learning Suite design for project based learning for East Side High School in Newark, NJ. Planner: Fielding Nair International. Please note that the placement of several computers along the wall was a school district requirement. This is NOT the recommended way to incorporate technology into a Learning Suite. The preferred method is to use mobile computers that can be deployed anywhere in the room with wireless networking. One or two hard-wired desktops are ok but these should be grouped in a way that encourages collaboration.

that spills over into adjacent areas for both indoor and outdoor learning.

Figure 1-8 is a further development of this concept. In this case, the plan for Tajimi Junior High School in Tajimi-shi, Gifu, Japan shows a Learning Suite where the boundaries of each classroom are more fluid and easier to change on a day-to-day basis because it is defined by furniture and not by walls.

As the above discussion and plans illustrate, it is possible to create Learning Suites using either moveable walls or mobile furniture. The East Side High School Learning Suite (Figure 1-7) and the Goa International School Learning Suite (Figure 12-2 in Pattern #12) show Learning Suites that use moveable walls, and the Tajimi example (Figure 1-8) uses mobile furniture. The key difference between these two approaches is

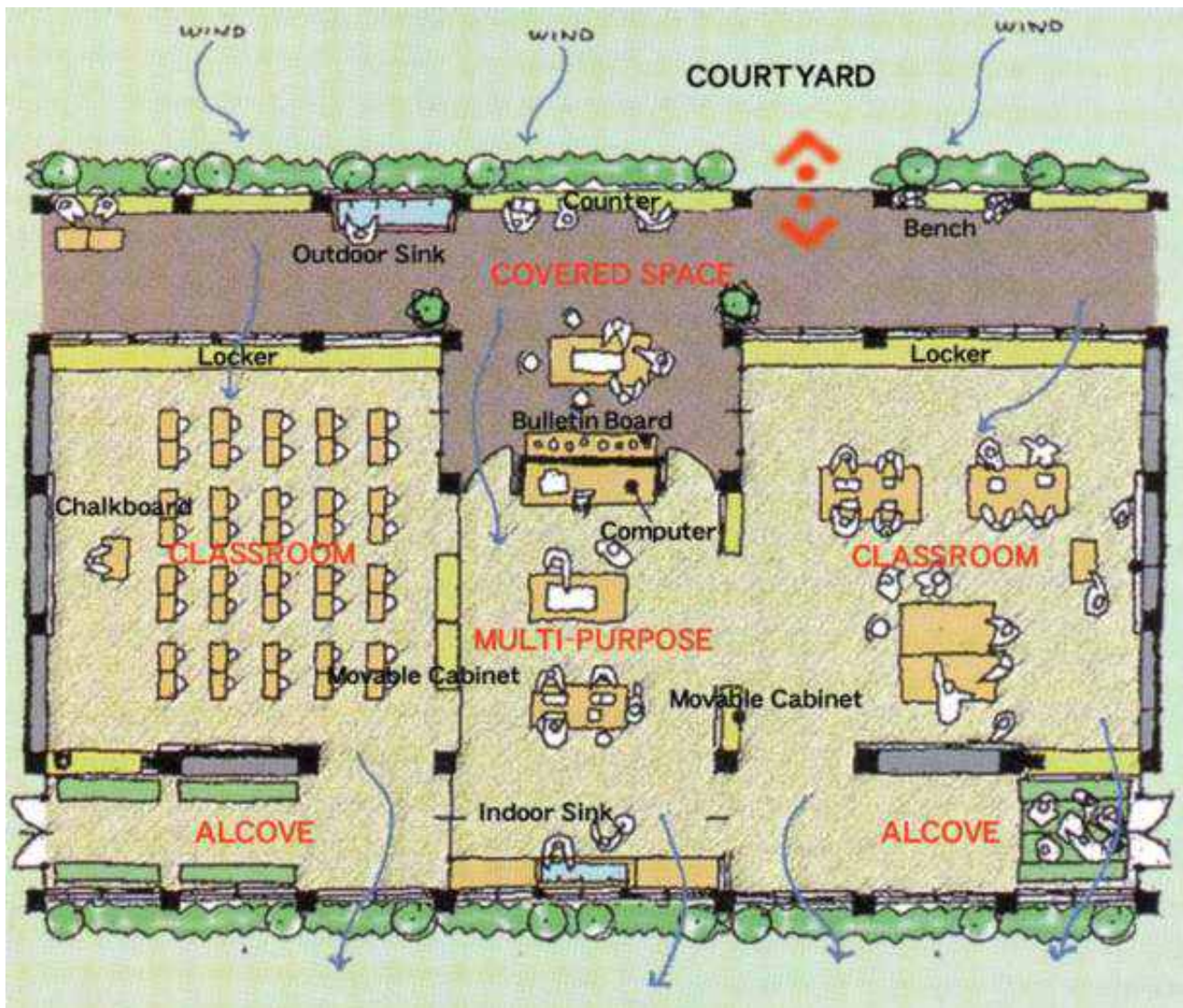


Figure 1-8. Learning Suite at Tajimi Junior High School in Tajimi-shi, Gifu, Japan. Architect: Atelier Zo.

that moveable furniture is typically experienced as a friendlier way to create a suite, whereas the moveable wall is more mechanistic and makes the division between Learning Studios more rigid.

The choice between the two approaches comes down to philosophical and operational issues. The more flexible furniture-based model is appropriate when the two Learning Studios are more likely to operate as one larger entity with the teachers working in close collaboration with each other. In this type of situation, the acoustical separation afforded by the moveable wall is not

much of an issue. Students get used to using their "indoor voices" much as they would in a family-type situation with the realization that the Learning Suite caters to many different learning activities dispersed between the two studios.

More traditional schools that are exploring the idea of team teaching and collaboration between classes, while still wishing to preserve the separation and independence of classrooms or Learning Studios as distinct units, will prefer the model with moveable walls.

Once we have repaired the basic building block of school—the classroom—it is

easier to move the school design to a whole new level—still not a completely new paradigm, but much closer than the cells-and-bells model.

### Small Learning Community Model

Figure 1-9 shows a Learning Studio-based Small Learning Community (SLC). This pattern takes the finger plan and makes it whole so that students occupying an SLC (in a finger arrangement or any other such separate grouping) can truly feel that they belong to that SLC. For this to work, each SLC needs to be somewhat complete.

For example, a Learning Studio-based SLC might contain its own science room, its own teacher workroom with the transparency needed for the space to serve as "eyes on the street," its own toilets, its own science lab and its own central multi-purpose social space that can be used for project work, independent study, distance learning, collaborative work, technology-based work and so on.

Figure 1-9 shows a simpler arrangement than the SLC described above with Learning Studios clustered around small group rooms and a café which doubles

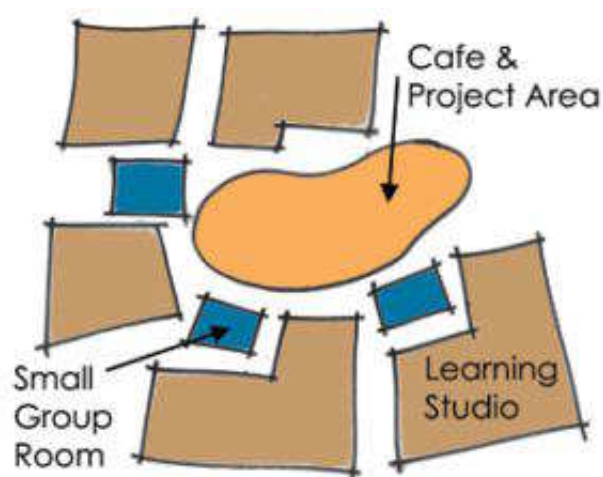


Figure 1-9. Design Pattern #1e: Learning Studio-based Small Learning Community (SLC).

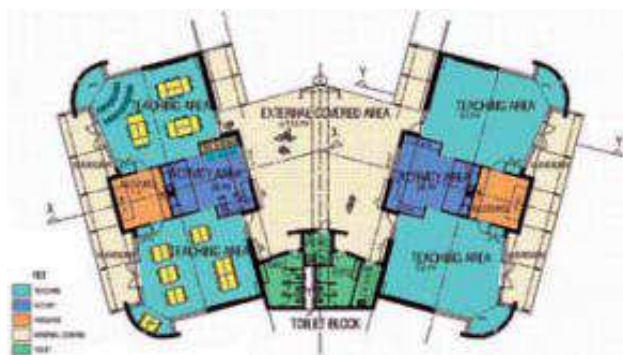


Figure 1-10. Djidi Djidi Aboriginal School design plan based on Design Pattern #1e, Pictou, Western Australia. Architect: Edgar Idle Wade.

as a project area. But even at this simple level, it is possible to create an effective SLC.

This particular pattern could be modified to show each SLC having its own direct connection to the outdoors. Additionally, each Learning Studio itself could have an outdoor connection.

The floor plan (Figure 1-10) and photograph of the Djidi Djidi Aboriginal School in Australia (Figure 1-11) feature another example of how Learning Studios can be combined with other common spaces to create self-contained Small Learning Communities.

We have utilized one more image to represent the SLC model. Figure 1-12, the High Tech Middle School in San Diego, California illustrates how a common area shared by an SLC might be used.

*SLCs and the Learning Street:* In the discussion of Small Learning Communities, the operative word is "small." The idea, always, is to create small groupings where everyone knows everyone else. Of course, the best way to achieve smallness is to make the school itself small—so that the SLC and the school refer to the same thing. However, a majority of school districts that are creating SLC's



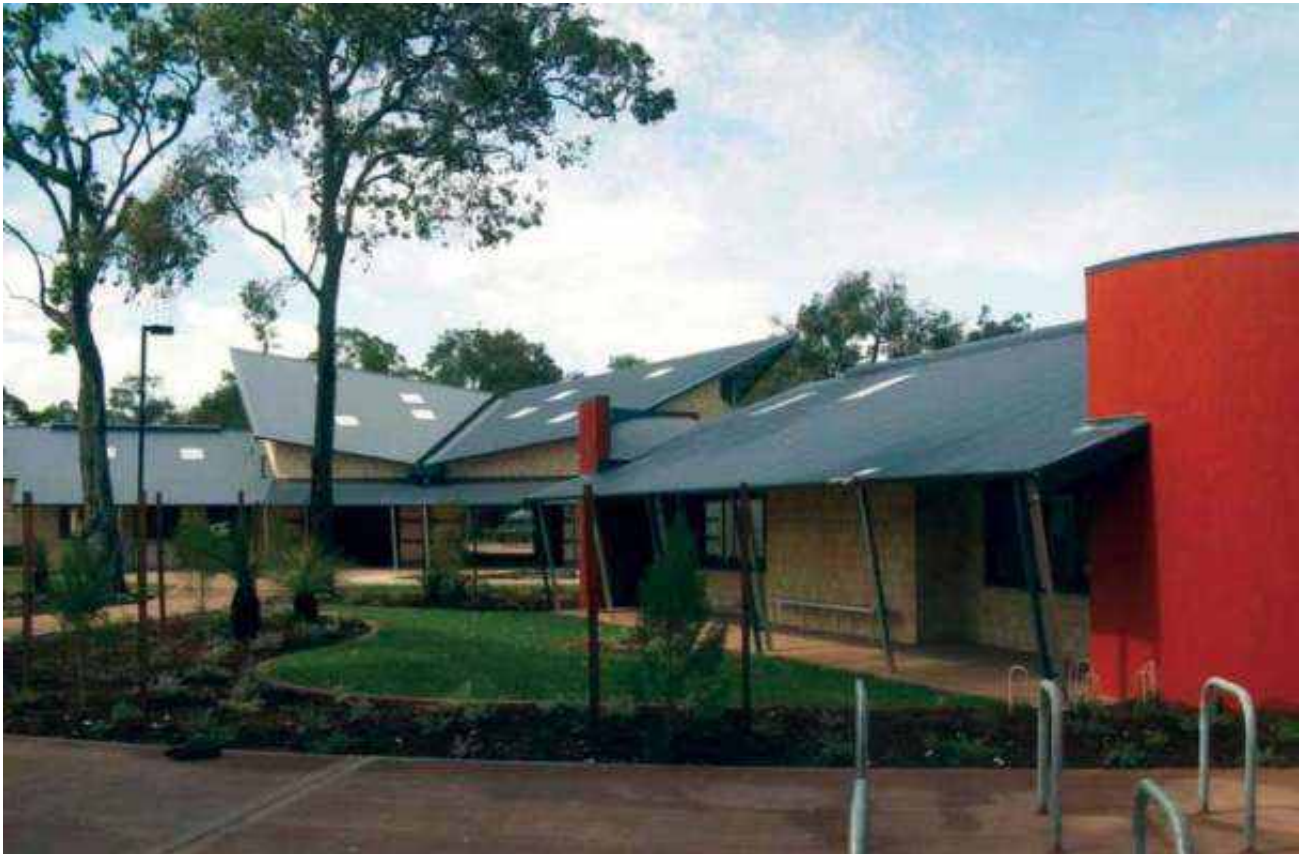


Figure 1-11. Djidi Djidi Aboriginal School, a Learning Studio-based SLC. (Photo Courtesy of Edgar Idle Wade Architects.)

are doing so by breaking up larger schools into smaller communities on the same campus. It is rare to see truly small public schools that could themselves qualify as SLCs. We are not going to tackle the question of small vs. big in this book—that subject is covered well in the KnowledgeWorks publication "Dollars and Sense—The Cost Effectiveness of Small Schools," which is included in the reference list at the end of this book.

Given today's reality that a majority of this country's schools are large and that communities will continue to build large schools, we feel that it is important to see how to preserve the benefits of SLCs in the larger schools.

One way to think about a large school is that it is a small town comprised of distinct neighborhoods—where

every neighborhood represents a Small Learning Community. It is impossible to put such a neighborhood/town concept



Figure 1-12. Shared social and learning space outside Learning Studios at High Tech Middle School in San Diego, CA. Architect: Carrier Johnson. (Photo Courtesy of Bill Robinson Photography.)

into practice, however, without first thinking about the "connectors" that tie the neighborhoods together. There are many ways in which schools can tackle the issue of connectors—but, whenever possible, opportunities should be explored to make the connectors into one or more unifying elements that give the larger school its identity.

Along these lines, an interesting idea that has been gaining currency is the notion of a Learning Street referred to earlier, which, like the Main Street in most small towns, becomes the unifying element that ties the town's various neighborhoods together and gives the town its identity.

We think that the Learning Street idea is still in its infancy in the school design world though the idea of unifying elements itself is not new. We have not raised the Learning Street to the level of a specific Design Pattern in this book, but it may well become one in a future edition. For now, we have acknowledged the importance of the Learning Street by including at the end of this book, a slightly modified version of an article we published on DesignShare.com in February 2005.

We have provided a few illustrations of what a Learning Street might look like but we encourage our readers to submit more examples to us that we can share with all of you.

### Advisory Model

Moving to the next level of development, we have a pattern that departs entirely from the "classroom" and "Learning Studio" model. Figure 1-13 shows an "Advisory model" of school design.

Interestingly, this model simply represents in the built form what many schools that

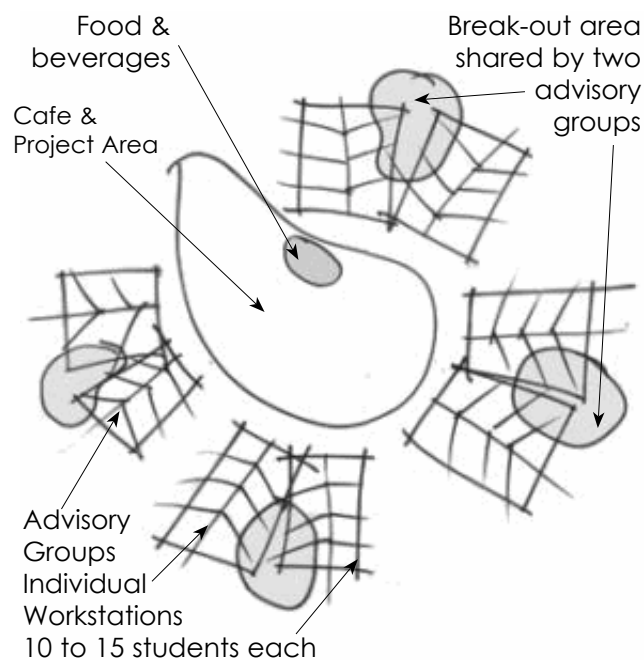
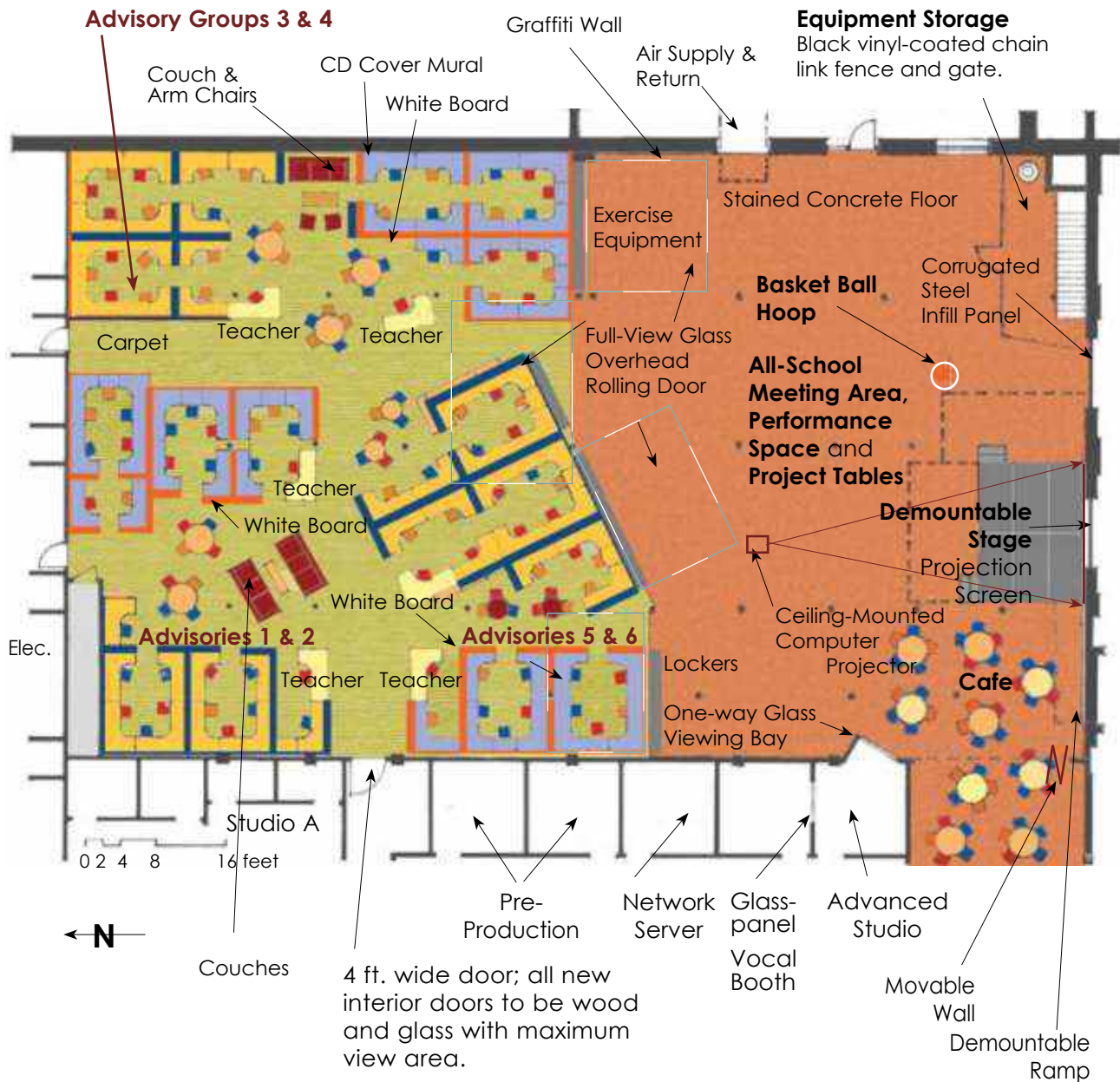


Figure 1-13. Design Pattern #1f: Advisory-based Small Learning Community (SLC).

look traditional have already begun to do organizationally—group students into advisories instead of classes or homerooms.

The Advisory pattern shown here (Figure 1-13) describes how eight groups of 10 to 15-student Advisories might be arranged around a central café and project area. This particular diagram also shows four breakout areas—which could be collaborative spaces with soft seating and an area for presentations. Each breakout space is shared by two Advisories under the suggested pattern. Since this is intended to be a rudimentary pattern, details have not been shown, such as an Advisory workstation for each teacher/advisor, a closed but partitionable seminar room that can be used for lectures and perhaps for distance learning, separate from project labs and "messy" areas.

The plan for the High School for Recording Arts—Hip-Hop High (Figure 1-14) and the photo of students at their



### Student Workstations

Each learner will have his own workstation and will share a computer with an adjacent learner. Laptop computers and a wireless network will also allow students to work at round tables, couches and on project tables.

### Advisory Groups

Each Advisory Group is comprised of 15 students and a teacher. Advisory Groups are paired so that a single teacher may advise two groups.

### Desktops

The pre-used desks, donated by a local bank, are 72" X 42". All tops are a neutral color; the colors shown indicate variations in partition colors.

### Low-height Partitions

of varying heights, located between desks are constructed of tackable, sound absorbing panels, made from recycled newspaper, and corrugated, wavy metal industrial siding.

Figure 1-14. Advisory-based SLC at the High School for Recording Arts (Hip-Hop High). Architect: Randall Fielding, Fielding Nair International.



Figure 1-15. Photograph of Advisory groupings showing individual workstations at Hip-Hop High.

workstations (Figure 1-15) shows an Advisory grouping next to a performance area that comes close to representing in built form, what Figure 1-13 is trying to accomplish diagrammatically.

Figure 1-13 begins to take the physical design of school into a functional model where there is a certain hierarchy of spaces, starting with a student workstation at the smallest level and leaving open the possibility of endless configurations of spaces and activities. This model makes learning the centerpiece of the design intent and builds the plan around learning activities, rather than a theoretically appropriate building block like the classroom. (See the 18 learning modalities discussed earlier.)

The plan for Harbor City International School (Figure 1-16) is another example of the Advisory model and shows how it allows for a much more efficient use of spaces than a traditional classroom model. The Harbor City plan is rare in that it has no corridors and utilizes almost every square foot of space for learning.

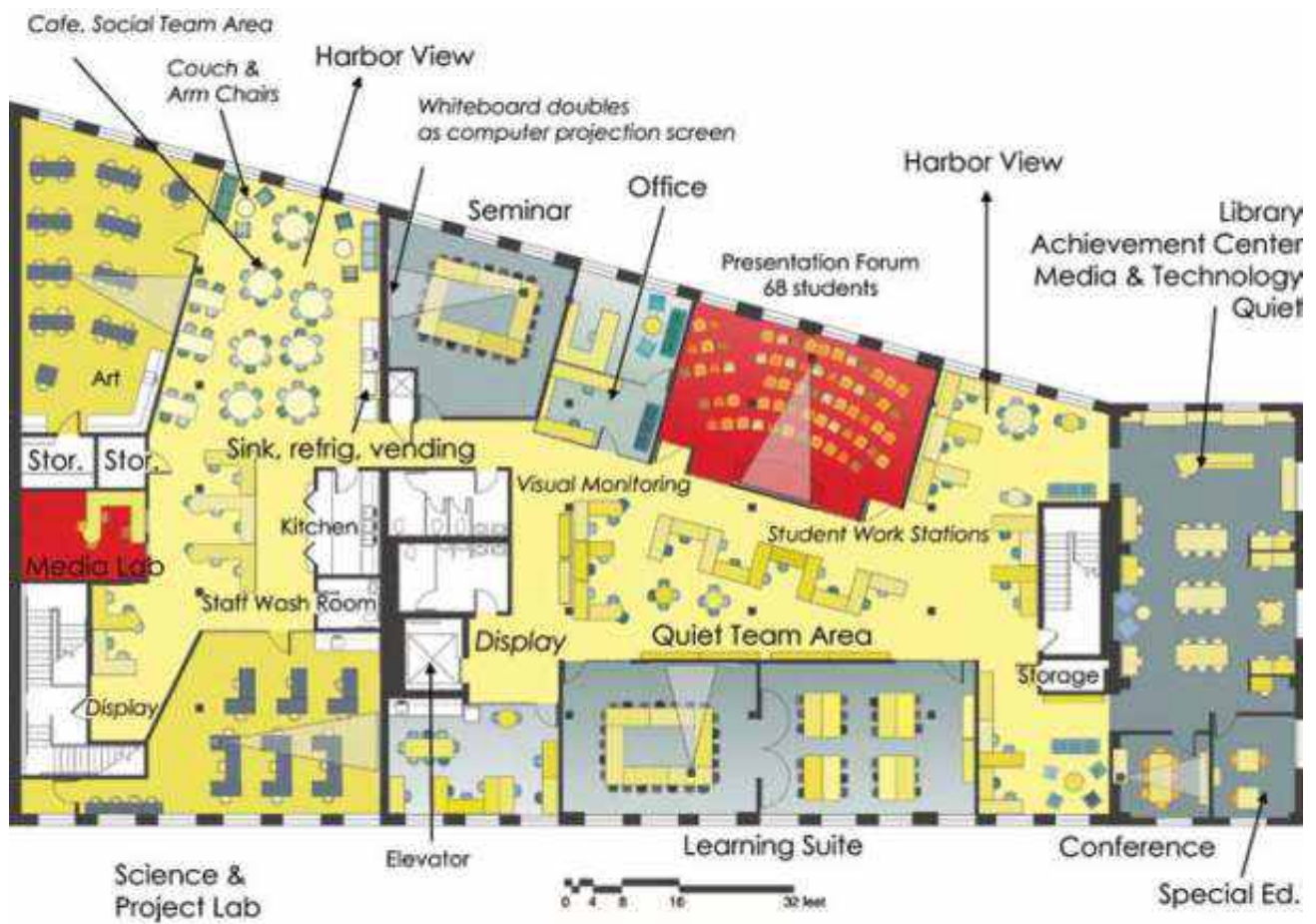


Figure 1-16. Advisory-based plan for Harbor City International School, Duluth, MN. Design Architect: Randall Fielding, Fielding Nair International, with Scalzo Architects.

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## About the Authors

**Prakash Nair,**  
*Partner, Fielding Nair International.*

Nair is recognized worldwide as an expert in the areas of modern school planning and educational technology. He is the recipient of several planning awards including the prestigious CEFPI MacConnell Award, the top honor worldwide for school planning and design. Nair worked as Director of Operations for a multi-billion dollar school construction program for New York City. His many articles about designing schools based on established educational research have been published by leading journals around the globe.

In 2003, Nair completed a project with the University of Wisconsin on a Rockefeller Foundation-funded grant to develop best practice standards for world-class schools throughout New Jersey and nationally.

Nair has served as Northeast Regional President of the Council of Educational Facility Planners International. He is the recipient of the organization's Service Citation and Distinguished Service Awards.



Nair has been invited by governments and professional organizations as a keynote speaker and consultant in 19 states and ten countries.

Contact Prakash Nair at [prakash@designshare.com](mailto:prakash@designshare.com).

**Randall Fielding,**  
*Partner, Fielding Nair International.*

Fielding wears two hats, one as an award-winning architect and planner working on school projects around the world, and another as the Founder and Editorial Director of DesignShare.com, an online journal and library of facility planning. DesignShare is a premier resource for research on the design of innovative learning environments. The website has received seven awards for design and quality of content, and receives 60,000 visitors a month from educators, architects, and planners worldwide. Fielding oversees DesignShare's annual international design awards program and has published 300 innovative school designs from 20 countries.

Prior to co-founding FNI, Fielding led his own architectural practice for over 17 years out of Chicago and Minneapolis. He is internationally recognized as an authority on innovative school design and is the recipient of numerous awards including the 2004 Impact on Learning Award from CEFPI and School Planning and Management Magazine. He has taken his unique message of creativity and innovation to nine countries and



has published numerous articles on school planning and design.

Contact Randall Fielding at [fielding@designshare.com](mailto:fielding@designshare.com).

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Prakash Nair is a partner with Fielding Nair International, an award-winning school planning firm and Managing Editor of DesignShare.com. Prior to that, he served for 10 years as Director of Operations for New York City's multi billion-dollar school construction program. Nair is widely published, has keynoted conferences and consulted in 19 states in the U.S. and 10 countries on four continents.

Randall Fielding is a partner with Fielding Nair International and the Founder/Editorial Director of DesignShare.com, building it from the grain of an idea in 1998 into the world's largest and most prestigious forum for innovative schools. Before starting DesignShare, Fielding ran his own architectural consulting firm for 17 years in Chicago. Fielding is recognized as one of the world's foremost creative and innovative school architects, and is the recipient of numerous design awards.

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