DOCUMENT RESUME

ED 460 592 EF 005 306

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TITLE	School Design Factors for Improving Student Learning.
PUB DATE	1999-00-00
NOTE	26p.; Photographs may not reproduce adequately.
PUB TYPE	Guides - Non-Classroom (055)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Educational Environment; *Educational Facilities Design; *Educational Improvement; Educational Objectives; Elementary Secondary Education; *Public Schools; School Effectiveness

ABSTRACT

Both built and natural environments embellish student learning; however, it is believed that there are far too many functional and structural design problems in schools. This document provides basic design factors from three perspectives: environmental; educational; and architectural. Selected developmentally appropriate characteristics of students are reviewed and linked to affective, behavioral, and cognitive learning categories. These characteristics are then matched with learning goals and activities. Appropriate architectural/natural support systems are defined and designs that match the learning goals are recommended. Appendices present the guiding principles of sustainable site and building designs. (GR)

School Design Factors for Improving Student Learning

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Abstract

Basic design factors are reviewed from three perspectives: Environmental, educational, and architectural. Selected developmentally appropriate characteristics of students are reviewed and linked to affective, behavioral, and cognitive learning categories. These characteristics are then matched with learning goals, and activities. Given these foundations, appropriate architectural/natural support systems are defined and designs that match the learning goals are recommended.

School Design Factors for Improving Student Learning

Introduction

Functional and structural design represent two primary considerations for the built and natural/architectural support systems for schools. Natural areas and built structures are two familiar examples of support systems for learning. The functional aspect of design is centered on what is happening in the educational program (the total curriculum), while the structural component (natural and built environments) "facilitates" the program component. Both built and natural environments embellish student learning (Learning as discussed in this article may be categorized according to affective, behavioral, and cognitive dimensions. For this discussion, these are called the ABCs of learning.)

Design, in the generic sense, is not an easy concept to define. What we know about the subject is broad and extremely subjective. It may be viewed as a rallying device for architects, landscape architects, city planners, and [educators] who have in the past been occupied with smaller and simpler matters (Tyrwhitt, 1957). Design should be considered in terms of 'what, why, and how, ' and the philosophy, objectives, and processes that exist in the educational scheme (Banghart and Trull, 1973).

A leading premise for this article is that there are far too many functional and structural design problems in schools. There are many built structures that do not and, in their present condition, cannot provide adequate support for the ABCs of learning.

With functional and structural problems continuing to be "built" into new schools, all of us should rethink the purpose of education and work to find a perspective of design that is amenable to the ABCs of learning. This must become a top priority for educators, architects, and school policy makers if we expect to deal with the enigmatic issue of "educationally unfriendly learning environments." Let us examine some perspectives of design as viewed by environmentalists, architects, and educators.

Basic Principles

From the environmentalist's perspective, basic design recognizes the needs of the human community. Therefore, school environments must be designed and built with an awareness of the interrelationships among natural, cultural, social, educational, and economic resources both locally and globally. The United States Department of the Interior's document entitled *Guiding Principles of Sustainable Design* (1997) presents several areas of interest for school designers and planners. Briefly, we will review some principles of site design and building design from the environmentalists' perspective:

First, we should consider a philosophy of site design. "As only one component of an interdependent natural system, the human species must develop a respect for the landscape and expend more effort understanding the interrelationships of soils, water, plant communities and associations, and habitats, as well as the impacts of human uses on them" (Chapter Five). ***Appendix A*** provides an excerpt on the sustainable philosophy of site design.

Although *Guiding Principles of Sustainable Design* focuses on national parks, there are several relevant lessons that we as planners and designers of educational learning environments may assimilate. For example, let us look at safety and security. Very little change is needed in both words and concept to transpose the following ideas for school site design.

Visitor Safety and Security

> The design of a tourism development involves a closer, more integrated relationship of visitors with nature. To some extent, this concept is contrary to some conventional provisions for visitor security and safety. Visitor awareness of their natural surroundings is the best safety insurance. Written and personal briefings by staff could help foster awareness of safety risks and allow visitors to take responsibility for their own safety and security. Some important design considerations are as follows:
>
> • Visitors must have a sense of personal safety and security to be attracted to recreation areas. The facility must have reasonable provisions to protect visitors from natural and synthetic hazards. Location of walks and lodging must be designed to discourage visitor contact with dangerous plants or animals.
>
> • Ecological integrity must be balanced with safety concerns in a development where adventure and challenge are integral to the experience. Various challenge levels in site facilities should be provided to accommodate all visitors, including visitors with disabilities.
>
> • The use of artificial lighting should be limited to retain natural ambient light levels - baffle lights or use ground-mounted light fixtures to limit spill over light impacts while providing a basic sense of security.
>
> • Appropriate atmosphere and security can be enhanced by controlled access to the facilities - incorporate natural barriers into facility design to minimize need for security fencing or barriers. (Chapter Five)

The ***second*** design factor offered in *Guiding Principles of Sustainable Design* is a 'sense of place' for buildings. The guiding principle of sustainable development and sustainable building design is to create optimum relationships between people and their environments. "More specifically, sustainable development should have

the absolute minimal impact on the local, regional, and global environments. Planners, designers, developers, and operators have an opportunity and a responsibility to protect the sanctity of a place, its people and its spirit" (Chapter Six).

Along this line of thinking, we discover a sustainable building philosophy dealing with design that balances human needs (rather than human wants) with the carrying capacity of the natural and cultural environments. Following this principle minimizes environmental impacts and the importation of goods and energy as well as the generation of waste. Therefore, sustainable design is an ecosystematic approach that demands an understanding of the consequences of our actions.

Those of us responsible for educational developments must recognize that by providing the students and community with knowledge of the natural and built environments, the structures can create the knowledge that is necessary to protect them. For example, if we show students the value of a built and natural learning environments, they will develop an appreciation for maintaining these areas. Somehow, we must convey the notion of ownership to students and the community. ***Appendix B*** provides additional ideas on a sense of place and the sustainable building design philosophy.

The theme of balance is the foundation for goals under the sustainable philosophy. We might think about translating the objectives below for school buildings.

Sustainable Building Design Objectives

> The long-term objective of sustainable design is to minimize resource degradation and consumption on a global scale. Thus the primary objective of sustainable building design is to "lead through

example" to heighten environmental awareness. Sustainable building design must seek to

- use the building (or non-building) as an educational tool to demonstrate the importance of the environment in sustaining human life
- promote new human values and lifestyles to achieve a more harmonious relationship with local, regional, and global resources and environments
- increase public awareness about appropriate technologies and the cradle-to-grave energy and waste implications of various building and consumer materials
- relay cultural and historical understandings of the site with local, regional, and global relationships (Chapter Six)

If we can accept the environmentalists' point of view, then the uniqueness of school environments could also create the curiosity for learning and the desire to experience success. This should be one of our goals. In providing school facilities and learning activities for students, we should take special care not to destroy the environment with educationally unfriendly designs and structures. The built environment should educate, not repress and depress, its users.

The Functional Components: The Educators and Architect's View

If educational learning environments are not user friendly, then the solution may be found by rethinking how we, the educators, communicate program needs to architects, engineers, and contractors. Our initial assignment is to match the complex areas of learning characteristics with developmentally appropriate learning goals and activities. These corresponding goals and activities, in turn, provide the foundation for functional design, which shapes structural design for the built learning environment. This must become the expected and mandated element of

school design and planning. By matching developmentally appropriate learning goals and activities with the 'right' built structures, we will have found a definitive answer to the question: Why do we do what we do in school design and construction?

There are some documented reasons for the problems in school design. We need not look any farther than the foundation for the "restructuring movement." Fiske (1995) provides some important implications for built learning environments when he charges that "American school architecture is as rooted in the 19th century values as every other aspect of education." (p. 2) He deals with the concern for trying to accommodate 21st century curriculum in 19th century architecture. One perceived problem is that schools are still organized around the "factory" model, which may be broadly defined as centralized authority. In this situation the teacher does the real "work," while the student learns to think by sitting in a passive mode and receiving information.

School structures need to be geared to developmentally appropriate learning goals and activities. 'Activities' imply that students do more than sit and read and listen and write. They get involved in developmentally appropriate projects that complement learning. Structural design must accommodate learning goals, a requirement causing architects and educators to investigate many learning possibilities in the context of the site, the community and the educational program.

The idea of designing configurations of possibilities is a foundation for acting on the knowledge we have about developmentally appropriate learning goals and

activities. Bakos, Bozic, and Chapin (1987, p. 270) state that ". . . It is only by becoming emersed within a place that it is possible to create what we call *configurations of possibilities.*" Design means becoming immersed within the concept and the setting. As Bakos, Bozic, and Chapin (1987, p 270) indicate, becoming immersed within a place means ". . . moving in and setting up drafting tables and sometimes building our own design on site." This involves knowledge of the functional program and the structural design. Educators must know the program functions clearly, have a sense of space relationships, a vision of the structure that will "facilitate" the program, and then communicate these important points to the architects, engineers, and contractors.

It is important to view design as a job for educators and architects working together and assisted by community influence. Perhaps school facility planners of the past had a much too limited focus on design. For example, the common elements in school planning such as surveys, student population forecasts, and educational specifications, alone, have proven to be inadequate. Antiquated educational specifications (often catalogued and computerized) have become policy in many states. We all know how difficult it is to change state policy and bureaucracy.

Changes in program brought on by the educational reform movement need to be considered (Moore & Lackney, 1995). The trend toward block scheduling has implications for the design of larger classrooms with technology assisted work stations. These changes suggest that communications from educational planners to

architects should include developmentally appropriate educational specifications and three-dimensional models of learning spaces (architectural support systems).

Communications between planners and designers must reveal that both groups know the learner for which the structure is being planned. Therefore, we must re-visit these questions: What goals and activities are necessary for learning? What are the reasons for certain structural designs?

These reasons may be depicted by a chart founded on knowledge of how students learn. This chart can then become a tool to suggest natural/architectural support systems. As an example, we will consider an elementary school setting pk - 2 (Five to seven years of age).

The Learning Support System

During these years, playing and fine/gross motor skill development are continuous. The children are developing memory, routine, emotional, and intellectual experiences. They acquire knowledge through concrete manipulatives geared toward size, quantity, space, and color. At this level, the children can recognize and recall information and ideas in the approximate form in which they were learned. They also construct knowledge through exploring their environments. They learn through observation and interaction with the learning environment and with other children.

The indoor environment for these age levels should stimulate interaction with other children and the structure itself. Concepts such as over, under, top, bottom, beginning, end and color relationships are only a few of the numerous

aspects incorporated in this built environment. Play is very significant for skill development and the outdoor environment should further stimulate gross motor development and social interaction such as turn taking, problem solving, and leadership development. A small *sample* of the ABCs of learning for the children at these development levels follows:

Affective Development.

Developmental characteristics include visual perspectives, spatial interrelationships, valuing life and property, color relationships, texture relationships, expressing emotions appropriately, building personal relationships, following instructions, and self-directing one's time and activities.

Learning, goals may involve being able to appreciate all forms of life, from insect life to human life. The appreciation for balance between the built environment and natural environment, harmony with nature, and the blending of natural surroundings' colors with the built environment's colors is an appropriate goal.

Learning, activities may be role playing, taking turns, painting, supporting others in practice efforts, digging in the soil, planning habitats, developing habitats, planting seeds and vegetation, harvesting items from the garden, and maintaining animal habitats and gardens.

Natural/architectural support systems may include site and contextually compatible buildings, smaller school buildings and

reduced class size [(15-20):1], the campus plan concept, natural/full spectrum lighting, adequate acoustics, visual and physical ties between the outdoor and indoor learning environments, greenhouse habitats, reptile and insect habitats, indoor and outdoor gardens, technologically friendly learning centers, color diversity, shape diversity, and ***buildings that resemble homes, not institutions.***

Behavioral Development

Developmental characteristics should involve role playing, cooperation with others, team building, skill development, personal satisfaction from accomplishments, and relaxation.

Learning goals center on the student's ability to take directions, give directions to others, take turns as a leader and follower, accept responsibility for one's action, gather materials, keep time, solve problems, and practice fine and motor skills.

Learning activities for this age group may have the student charting and explaining information, supporting classmates with kind words, interacting successfully with people, plants, and animals, taking turns in class activities, planning activities, and participating in maintenance projects.

Natural/architectural support systems for behavioral development cover those presented in the affective section. They allow student projects such as construction of indoor and outdoor green houses and

animal habitats, terrariums for plants and reptiles, habitats for insects, and the development of an aqua lab canal system. An outdoor area for "adventure-based learning" enhances behavioral development.

Indoor and outdoor spaces for hands on activities are required.

Cognitive Development

Developmental characteristics consist of recognition of things, information recall, sequencing of objects and numbers, practice, interpretation of information, and dramatization.

Learning goals entail ability to recognize shapes, sizes, relationships, remember facts, interpret data based on written student-prepared charts, explain facts, summarize findings, and describe detailed events.

Learning, activities encompass reading, writing, explaining concepts and objects to groups, taking pencil and paper examinations, pretending, constructing/de-constructing, manipulating objects, preparing soil for gardening, harvesting and separating seeds and plants, measuring and charting growth, reading weather station instruments and charting trends in temperatures and humidity.

Natural/architectural support systems to support cognitive development may include all those areas presented in the previous sections. Smaller schools and lower student to teacher ratios are expected to improve the student's cognitive development. Computer stations, science and mathematics laboratories, and language

laboratories as part of the 'block scheduling' themes may improve learning. The notion of "great spaces" (Moore & Lackney, 1995), flexible and adaptable learning areas, and user friendly scales are important. Research on connections between the physical characteristics of school facilities and educational outcomes is beginning to be recognized as a need. ***Larger spaces for indoor learning activities in smaller schools are recommended as a part of developmentally appropriate design.***

Additional ideas may be found on developmentally appropriate practice for early childhood programs (Bredekamp, 1990). There is a current void on research that compares the influence of design on learning, especially at the middle and high school levels. The National research Council is currently taking steps to launch research on school design and educational outcomes.

A Model of a Natural/Architectural Support System

Campus Plan

The campus plan model reduces the institutionalization of schools. It also has the potential for supporting the ABCs for learning environments described above. Large schools with small spaces for learning (high student density, such as 2000 students per high school) have more discipline problems. Student achievement tends to be lower in large, high density schools. As an alternative, the School Design and Planning Laboratory is proposing a campus plan model [2] to guide

our thinking as we design schools.

Moore and Lackney (1995) reveal several design patterns that complement the campus plan. The campus plan includes smaller buildings and classrooms, as shown in Figure 1. School, in the campus plan model, is a community hub, since it is in a 'subdivision' setting. In the campus model, one 'school house' might be exclusively for one grade level, while the 'school house' for large meetings and play could serve interaction and social functions. The classroom suite, a common reform idea, is a series of structures that adapt to learning activities. Large classrooms with small work stations may also be used for hands on learning (computer stations, science, mathematics, and language laboratories, for example).

The model elementary school suggested by SDPL's associates (Figure 1) is designed for 300 to 350 students (pk - 5), requires a 15-acre site, and includes eight distinct 'school houses.' This complex may be constructed at less cost than the traditional institutionalized complex (This issue is under study). Covered walkways may be added in some strategic places. Solar power is recommended for efficiency, and a garden area is the centerpiece of the school.

A "Tiny Town [3]" outdoor learning environment (Figure 2) is included. Play areas for team sports, not shown here, are located at the extremities of the site. There are variations in roof slopes and colors (Figures 1 and 2) that lend an artistic value to influence the affective dimension of learning and blend with the surroundings

(a sense of place). The SDPL recommends pitched metal roofs. These are available

in a variety of colors.

Conclusion

We are at a critical stage in designing and planning school environments in the United States because current policies dictate and support obsolete design. Planners must emphasize designs that are in harmony with developmentally appropriate educational goals and activities. Furthermore, educators and architects need to work together in providing user friendly schools, free of dated educational specifications. Unfortunately, there are few designs that escape the censorship of bureaucracies. Our obligation is to conduct research that emphasizes the influence of school design on the ABCs of learning and the educational outcomes of functional and structural design.

Notes

[1] Pupil-teacher ratio: One full time classroom teacher for each 30 pupils in membership. Teaching station: (30' x 35') or 1050 sq. ft. (for the elementary school)

[2] The campus model shown here was constructed by Dr. Lawrence Stueck, a SDPL associate. http://www.coe.uga.edu/sdpl/assoc.html

[3] http://www.coe.uga.edu/sdpl/tinytown/tinytown1.html

References

Bakos, M., Bozic, R., & Chapin, D. (1987). Children's spaces: Designing configurations of possibilities. In C. S. W einstein and T. G. David (Eds.) Spaces for Children: The Built Environment and Child Development (pp 269 -288). New York: Plenum Press.

Banghart, F. W., &Trull, A. Jr. (1973). Educational Planning. New York: The Macmillan Company.

Bredekamp, S. (Ed) (1990). Developmentally Appropriate Practice in Early Childhood Programs Serving Children From Birth Through Age 8. Washington, DC: National Association for the Education of Young Children.

Fiske, E. B. (1995). Systematic school reform: Implications for architecture. In A. Meek (Ed.) Designing Places for Learning (pp. 1-10). Alexandria, VA: ASCD.

Guiding Principles of Sustainable Design (1998): U. S. Department of the Interior: National Park Service. Online. (http://www.nps.gov/dsc/dsgncnstr/gpsd/toc.html)

Moore, G. T., & Lackney, J. A. (1995). Design patterns for American schools: Responding to the reform movement. In A. Meek (Ed.) Designing Places for Learning (pp. 1-10). Alexandria, VA: ASCD.

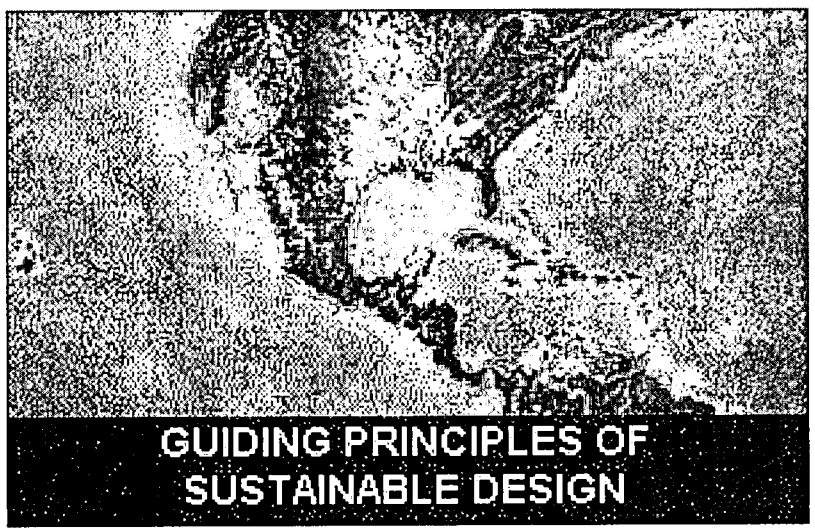
National Research Council, 2101 Constitution Avenue, Washington, DC 20418.

School Design and Planning Laboratory (1997): The University of Georgia, Athens. (http://www.coe.uga.edu/sdpl/model/model.html)

Tyrwhitt, J. (April, 1957). "Definitions of Urban Design," Synthesis. Cambridge, Mass: Harvard University Graduate School of Design.

Appendix A

http://www.nps.gov/dsc/dsgncnstr/gpsd/toc.html



Chapter 5: SITE DESIGN

Site design is a process of intervention involving the location of circulation, structures, and utilities, and making natural and cultural values available to visitors. The process encompasses many steps from planning to construction, including initial inventory, assessment, alternative analysis, detailed design, and construction procedures and services.

SUSTAINABLE SITE DESIGN PHILOSOPHY

In many places, the land is more damaged than previously believed. Soil erosion, groundwater contamination, acid rain, and other industrial pollutants are damaging the health of plant communities, thereby intensifying the challenge and necessity to

restore habitats. As only one component of an interdependent natural system, the human species must develop a respect for the landscape and expend more effort understanding the interrelationships of soils, water, plant communities and associations, and habitats, as well as the impacts of human uses on them.

> ***Sustainable design is not a reworking of conventional approaches and technologies, but a fundamental change in thinking and in ways of operating - you can't put spots on an elephant and call it a cheetah.***
> -- Carol Franklin, Andropogan Associates, Ltd.

Beyond a change in basic approach, sustainable site design requires holistic, ecologically based strategies to create projects that do not alter or impair but instead help repair and restore existing site systems. Site systems such as plant and animal communities, soils, and hydrology must be respected as patterns and processes of the living world. These strategies apply to all landscapes, no matter how small or how urban. Useful in understanding sustainable ecologically-based site design are the "Valdez Principles for Site Design,"developed by Andropogon Associates, Ltd. These strategies are precedent-setting in their application and especially important to rightfully integrate the built environment into a setting or site.

Recognition of Context. No site can be understood and evaluated without looking outward to the site context. Before planning and designing a project, fundamental questions must be asked in light of its impact on the larger community.

Treatment of Landscapes as Interdependent and Interconnected. Conventional development often increases fragmentation of the landscape. The small remaining islands of natural landscape are typically surrounded by a fabric of development that diminishes their ability to support a variety of plant communities and habitats. This situation must be reversed. Larger whole systems must be created by reconnecting fragmented landscapes and establishing contiguous networks with other natural systems both within a site and beyond its boundaries.

Integration of the Native Landscape with Development. Even the most developed landscapes, where every trace of nature seems to have been obliterated, are not self-contained. These areas should be redesigned to support some component of the natural landscape to provide critical connections to adjacent habitats.

Promotion of Biodiversity. The environment is experiencing extinction of both plant and animal species. Sustaining even a fraction of the diversity known today will be very difficult. Development itself affords a tremendous opportunity to emphasize the establishment of biodiversity on a site. Site design must be directed to protect local plant and animal communities, and new landscape plantings must deliberately reestablish diverse natural habitats in organic patterns that reflect the processes of the site.

Reuse of Already Disturbed Areas. Despite the declining availability of relatively unspoiled land and the wasteful way sites are conventionally developed, existing built areas are being abandoned and new development located on remaining rural and natural areas. This cycle must be reversed. Previously disturbed areas must be reinhabited and restored, especially urban landscapes.

Making a Habit of Restoration. Where the landscape fabric is damaged, it must be repaired and/or restored. As most of the ecosystems are increasingly disturbed, every development project should have a restoration component. When site disturbance is uncontrolled, ecological deterioration accelerates, and natural systems diminish in diversity and complexity. Effective restoration requires recognition of the interdependence of all site factors and must include repair of all site systems - soil, water, vegetation, and wildlife.

The above strategies can serve as policy **guidelines in site design** for developed areas of national park lands and challenge the design of appropriate tourism development.

Appendix B

http://www.nps.gov/dsc/dsgncnstr/gpsd/ch6.html

Chapter 6: BUILDING DESIGN

Sense of Place

The concept known as bioregionalism is based on the idea that all life is established and maintained on a functional community basis and that all of these distinctive communities (bioregions) have mutually supporting life systems that are generally self-sustaining. Human civilization is an integral part of the natural world and is dependent on the preservation of nature for its own perpetuation. Over the ages the complex interaction of natural evolution and human adaptation has given every place on earth a unique set of qualities that sets it apart from all other places.

Preserving the special characteristics of a place requires in-depth understanding of the natural systems in place and immersion into the time-tested cultural responses to that environment's assets and liabilities. In meeting the needs of the human community, development must be designed and built with an awareness of the interrelationships between natural, cultural, social, and economic resources both locally and globally. Development must be limited to improving human life within the carrying capacity of resources and ecosystems. Development must not be an economic activity fueling the belief in endless growth. Thus the goal of sustainable development and sustainable building design is to create optimum relationships between people and their environments.

More specifically, sustainable development should have the absolute minimal impact on the local, regional, and global environments. Planners,

designers, developers, and operators have an opportunity and a responsibility to protect the sanctity of a place, its people and its spirit.

It is the uniqueness of certain environments that creates the curiosity for tourism and the desire to experience their special relaxative, recuperative, or recreative qualities. In providing facilities and activities for visitors, special care must be taken not to destroy the very resources or qualities they come to experience. This requires built environments that can sensitize and educate its users. Those responsible for park- and tourism-related developments must recognize that by providing knowledge of the environment, they create the knowledge that is necessary to protect it.

SUSTAINABLE BUILDING DESIGN PHILOSOPHY

Sustainable design balances human needs (rather than human wants) with the carrying capacity of the natural and cultural environments. It minimizes environmental impacts, it minimizes importation of goods and energy as well as the generation of waste. The ideal situation would be that if development was necessary, it would be constructed from natural sustainable materials collected on site, generate its own energy from renewable sources such as solar or wind, and manage its own waste.

Sustainable design is an ecosystematic approach that demands an understanding of the consequences of our actions.

CHECKLIST FOR SUSTAINABLE BUILDING DESIGN

General

The design must

- be subordinate to the ecosystem and cultural context
  - o respect the natural and cultural resources of the site and absolutely minimize the impacts of any development
- reinforce/exemplify appropriate environmental responsiveness
  - o educate visitors/users about the resource and appropriate built responses to that environment.
  - o interpret how development works within natural systems to effect resource protection and human comfort and foster less consumptive lifestyles
  - o use the resource as the primary experience of the site and as the primary design determinant
- enhance appreciation of natural environment and encourage/establish rules of conduct
- create a "rite of passage"
  - o develop an entrance into special natural or cultural environment that emulates the respectful practice of removing shoes before entering Japanese home . . . leaving cars and consumptive values behind

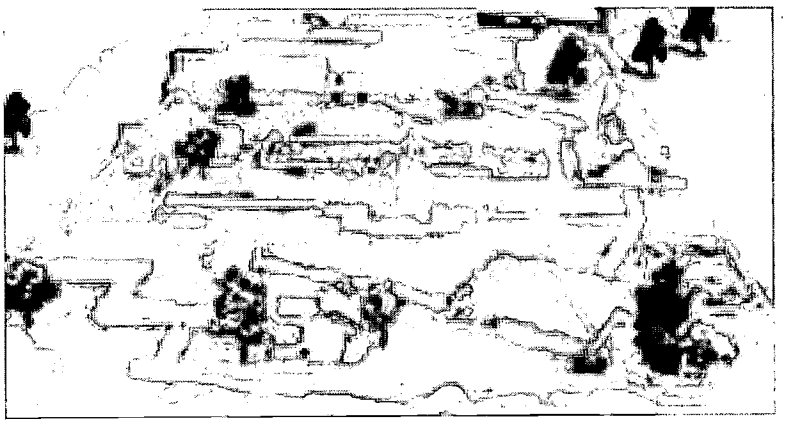
- use the simplest technology appropriate to the functional need, and incorporate passive energy-conserving strategies responsive to the local climate
- use renewable indigenous building materials to the greatest extent possible
- avoid use of energy intensive, environmentally damaging, waste producing, and/or hazardous materials
  - o use cradle-to-grave analysis in decision making for materials and construction techniques
- strive for "smaller is better" . . . optimizing use and flexibility of spaces so overall building size and the resources necessary for construction and operation are minimized
- consider "constructability" . . . striving for minimal environmental disruption, resource consumption, and material waste, and identifying opportunities for reuse/recycling of construction debris
- provide equal access to the full spectrum of people with physical and sensory impairments while minimizing impacts on natural and cultural resources

Also, the design should

- consider phasing the development to allow for monitoring of resource impacts and adjustments in subsequent phases
- allow for future expansion and/or adaptive uses with a minimum of demolition and waste
  - o materials and components should be chosen that can be easily reused or recycled
- make it easy for the occupants/operators to recycle waste

About the Author
C. Kenneth Tanner, Professor of Educational Leadership, the University of Georgia . He has been involved in school facilities planning since the 1970s and worked for 13 years as a consultant with the University of Tennessee's School Planning Laboratory. Currently, he teaches school planning and design courses at UGA and works in consulting service activities. He has been involved in school design and planning activities in Illinois, Missouri, Kentucky, West Virginia, Tennessee, Alabama, South Carolina, and Georgia. Dr. Tanner has published three books on planning and written over 100 articles, papers, and chapters, many of which deal with some aspect of planning. His recent planning activities may be found at the SDPL's Web site: http://coe.uga.edu/sdpl/sdpl.html

Figure 1. The Campus Plan



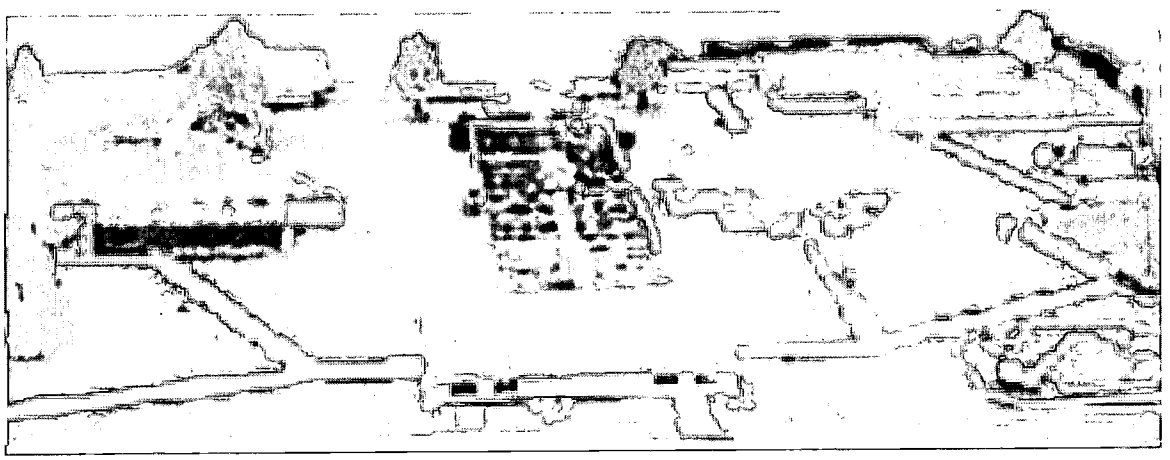
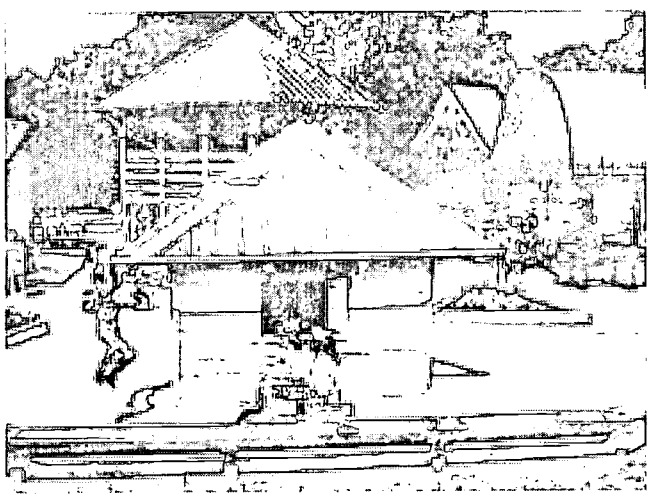


Figure 2. Tiny Town

Tiny Town's artistic atmosphere, full of textures and colors (green, red, blue, white, and silver) that blend with the surroundings, lends itself well to the affective dimension of learning. Two children in the foreground ride a tricycle (No. 5 Fire Chief) and make-believe they are cruising the town on a fire truck. On the opposite side, the sign 'NORTH,' attached to the sheltered playscape, lends a cognitive dimension for the study of direction and time. Tiny Town is also a sundial, with times painted on the wooden walk that surrounds the play area.
Learning to share spaces and toys, as well as taking turns, provides for the child's behavioral development. Children learn about life in 'Tiny Town'.



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