May 1992

Guidelines for Planning Future Public School Facilities: A Trends-oriented Approach

Harold E. Coffey
East Tennessee State University

Order Number 9222251

Guidelines for planning future public school facilities: A trends-oriented approach

Coffey, Harold Edward, Ed.D.

East Tennessee State University, 1992

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

Guidelines for Planning

Future Public School Facilities:

A Trends-Oriented Approach

A Dissertation

Presented to the Faculty of the Department of

Educational Leadership and Policy Analysis

East Tennessee State University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

---

by

Harold Edward Coffey

May 1992

APPROVAL

This is to certify that the Advance Graduate Committee of

Harold Edward Coffey

met on the

26th day of March, 19 92.

The committee read and examined his dissertation, supervised his defense of it in an oral examination, and decided to recommend that his study be submitted to the Graduate Council and the Associate Vice-President for Research and Dean of the Graduate School, in partial fulfillment of the degree of Doctor of Education in Educational Administration.

Chairman, Advanced Graduate Committee

Signed on behalf of the Graduate Council

Associate Vice-President for Research and Graduate Studies

ABSTRACT

GUIDELINES FOR PLANNING FUTURE PUBLIC SCHOOL FACILITIES:

A TRENDS-ORIENTED APPROACH

by

Harold Edward Coffey

The purpose of this descriptive qualitative study was to establish guidelines for planning future public school facilities based upon identified global, societal, and educational trends that would most likely highly impact upon the types of public school facilities that will be built in the future.

Based upon an extensive literature review, interviews with educational practitioners and facility specialists, and on-site visits to 15 schools in four states, 66 guideline elements were developed. These elements were submitted in a questionnaire/rating sheet format to a researcher-selected jury of 13 national educational facility planning specialists (100% Response Rate) for their evaluations.

The five sections for which the final set of guidelines were established were: (1) Planning, Design, and Site Selection; (2) Environmental Enhancement Factors; (3) Space Utilization; (4) Technology; and (5) School and Community Service Areas. The findings were that all 66 guidelines were rated as essential, highly desirable, or significant by the jurors.

The major conclusions reached from the study were several:

1. Educational practitioners advocated systematic, proactive, long- and short-range facility planning. This planning should be broad-based and pluralistic with flexibility, mobility, and adaptability as the cornerstones of the school design process. All planning should be based on both "hard" and "soft" data. Planning should also be both bottom-up and top-down with maximum information shared with the stakeholders.
2. Aesthetic, psychological, and behavioral environmental enhancement factors were key areas in future school designs. Facilities should be student-centered and "user-friendly" with an external welcoming appearance. The selection of the school site was extremely important, also.
3. Schools should be designed to offer optimal comfort to all inhabitants with flexible spaces where teachers and students can learn, relate, and explore. Schools and communities should share resources if possible.

INSTITUTIONAL REVIEW BOARD APPROVAL

This is to certify that the following study has been filed and approved by the Institutional Review Board of East Tennessee State University.

Title of Grant or Project Guidelines for Planning Future Public School Facilities: A Trends-Oriented Approach

Principal Investigator Harold Edward Coffey

Department Educational Leadership and Policy Analysis

Date Submitted January 15, 1992

Institutional Review Board, Chairman Anthony J. DeLucia

ACKNOWLEDGMENTS

The writer wishes to express his gratitude to the many educators and facilities professionals who cooperated and assisted in this study. The concern and quiet patience of all these individuals, including the secretaries who scheduled numerous appointments for interviews and on-site visits, will not be forgotten.

Sincere appreciation is extended to the writer's committee: Dr. Robert L. McElrath, Chairperson; Dr. Floyd H. Edwards; Dr. Charles W. Burkett; Dr. J. Howard Bowers; and Dr. William L. Stone. Special acknowledgment is made to Dr. Robert McElrath for his time and suggestions in directing this study.

Appreciation is expressed to the members of the jury who took time out from their busy schedules to give valuable comments and graciously provided many extra bits of information and reference materials.

Finally, to Andrea who is both his wife and co-doctoral fellow, the writer wishes to express his appreciation for the patience, friendship, and encouragement that she provided in the last three years of work and study.

TABLE OF CONTENTS

CHAPTER PAGE

CHAPTER PAGE

Chapter Page

CHAPTER 1

Introduction

Very few students in the 21st century will be educated in the simple rural one-room schoolhouses that were so prevalent at the turn of the last century (Kindley, 1985). Today, even with increased enrollments, the number of schools has gradually decreased each year (Snyder, 1990). The trend in school designs in the last 25 years seems to be toward urban consolidated school systems that cater to the needs of as many as 3,000 or more students in Pentagon-like complexes (Brubaker, 1990, p. 15).

Our society is rapidly approaching a new era of unprecedented schoolbuilding programs as witnessed by the $980 million dollar bond project just passed for 49 new schools in Dade County, Florida. In 1989, our country spent $10 billion on public school facilities alone (Goldberg, 1990, p. 9). Part of this increase is attributable to the age and condition of our public school buildings. Approximately, 61% of our existing school facilities were constructed in the 1950s and 1960s. Many of these "throwaway" facilities, which were hastily and cheaply built at that time to accommodate the rapid influx of baby boom students, are now reaching the end of their 30-year life expectancy and must soon be renovated or replaced (Gardner, 1987, p. 24).

The 1989 Education Writers Association report, entitled Wolves at the Schoolhouse Door, chilled the public with the statistics that 25% of our nation's school buildings are shoddy, run down, and inadequate, while another 33% are merely adequate physical structures for learning--only 42% of school facilities were considered to be in good condition (p. 1). The sobering price tag on new or renovated education infrastructures is approximately $84 billion with an additional $41 billion needed for maintenance repairs on such items as roofs, boilers, electrical systems, and facility structural elements. The total bill for all of these renovation and maintenance/repair projects amounts to more than an estimated $125 billion needed by our country to update facilities (Goldberg, 1990, p. 1).

Not only are our public school facilities in a deplorable state, but they may also be woefully inadequate to handle the next 10 years of enrollment crunches. It has been estimated the student enrollments will increase by 21% and will peak at about 45 million students in the year 2000, just slightly below the all-time high enrollment figures of 1971 (Snyder, 1990, p. 26).

In view of spiraling enrollments, dilapidated facilities, and rising costs to cover new expensive technologies and programs, the next 20 years could be the most expensive and dynamic in American educational history (Ornstein, 1990, p. 36). These problems are further exacerbated because of the lack of adequate facilities research data. The Education Writers Association succinctly stated in Wolves at the Schoolhouse Door, "Nationally, not even a marginally adequate data base about school facilities exists" (p. 3).

Public School administrators are often given the difficult assignment of undertaking expensive public school building projects without adequate school planning resources to do the very best job. School districts have a duty to provide exceptional school facilities that will be adequate to encompass myriad educational programs. These same public school buildings must also be responsive to the societal needs of the community by availing themselves to before- and after-school care, plus health and family support services. Children must be educated in a manner that is indicative of their relationship to the global society. Based upon these needs, it would seem to be imperative for school administrators to have greater access to very current, forward-thinking sources of information to use in making their planning decisions.

If global, societal, and educational trends that will likely impact educational facilities could be identified, then perhaps future facility planners could more readily employ what (Shane, 1989) called an "educated foresight"

(p. 4) in their planning paradigms. Coleman (1989) and Benjamin (1987) have both illustrated that spotting trends in the educational arena is a pragmatic way to approach future changes. If these trends could be identified, and a trends-oriented approach to planning school buildings could be explored, then perhaps this might be a possible path towards school facilities, which are more malleable and cost-effective for the future.

Statement of the Problem

The problem of this study was that presently there are insufficient amounts of comprehensive, research-based resources and materials for public school facility planning available for educational practitoners to use in designing future school faclilities.

Subproblems

The following subproblems were identified in order to adequately treat the problem:

1. To trace the historical, philosophical, and architectural development of school facilities, and to identify significant global, societal, and educational trends that might impact upon future public school planning.

2. To establish proposed guideline elements for planning future public school facilities.

3. To validate the guidelines established in subproblem two.

Purpose of the Study

The purpose of this study was to identify significant global, societal, and educational trends that will markedly influence the design features of future public school facilities. On the basis of this information, guidelines were developed to be used by practitioners in planning future public school facilities.

Significance of the Study

Our nation is about to embark upon one of the most fascinating and exciting change-eras in its history. In the next 20 years, the sheer magnitude of the scientific, technological, environmental, and demographic changes, which are going to take place, will be in quantum non-sequential proportions to what has been experienced thus far (Toffler, 1980; Naisbitt, 1982). For educators, the explosion of all this knowledge and change can be a numbing, mind-boggling experience, or a window of opportunity to try and create even better schools. In looking at our present school facilities, they are rapidly deteriorating and in need of massive maintenance programs (Education Writers Association, 1989). Many schoolhouses today are somewhat akin to an old worn couch that has been used so many years that its springs are showing, and the cover is torn and discolored. It was once new and ready for service, but the years have taken their toll in wear and tear; it is still serviceable, but the owners know that they must soon find another couch to take its place. Both the school and the couch can still be used, but they are probably not as comfortable or functional as they used to be.

Our educational facilities have served us well. Many prescient administrators and planners realize that adaptive and pliant facilities must be planned and built to handle the constantly changing curricula. Additionally, thousands of new school facilities must be built by the year 2000 to handle the 44 million students that will be enrolled (Snyder, 1990, p. 6). The imperative to plan and construct innovative, energy-efficient, and user-friendly school environments has never been greater or more challenging (Gardner, 1988; Earthman, 1988).

Accountability and cost-consciousness are the buzzwords of this decade. Educators and administrators cannot afford to squander money already in such tight supply. One possible approach to all of these problems seems to be an examination of the projected trends in not only education but in demographics and society. It seems plausible that these trends, predicated on the knowledge of experts, can be translated into practical guidelines for designing future educational facilities; perhaps then, an even better informed administrator, school board member, or citizen can more closely approximate the needs of our facilities in the future.

Educational wisdom suggests that the best decisions are those made with the best available resources. It is possible these guidelines and suggestions might allow an administrator or school system to make more informed, research-based decisions about the facilities that they build based upon the knowledge of facilities specialists.

Hoy and Miskel (1991) recounted that professionals must acquire a "coherent knowledge base" (p. 142), along with practical experience in order to make "technically correct decisions in [their] field of specialization" (p. 142). Perhaps, if in a small way, this research can add to the body of knowledge in a positive manner that will allow one practitioner to make a sounder, more informed, and professional decision, then this study will be successful.

Research Questions

1. What are the most pressing needs for educational facilities in the future?

2. As educators, administrators, and concerned citizens, what are the goals to seek in designing and implementing future school facilities?

3. What types of global, societal, and educational trends can be identified that will enable educational practitioners to plan more carefully the kinds of facilities that they construct?

4. What guidelines can be formulated for planning future school facilities?

Assumptions

1. Sources of interviews, administrators, planners, and experts would respond in an honest, forthright manner.

2. Essential elements, trends, and guidelines could be identified and validated as predictors for planning future school facilities.

3. Guidelines developed would be a helpful tool to practitioners in planning future school facilities.

Limitations of the Study

1. The investigation was limited to a descriptive qualitative study of guidelines for public schools.

2. This study was limited to visitations of innovative futuristic school facilities built or renovated after 1985. Interviews in those schools were limited to those individuals readily accessible during the on-site visitations.

3. This study did not encompass all possible global, societal, and educational trends; therefore, this approach was not definitive. Rather, this research was designed to allow the practitioner some valuable insights into school facility planning, which may be used as a stepping stone for further study in certain critical areas.

It was anticipated that this investigation would inspire the administrator or board member to dig even deeper into the research literature for answers to specific questions.

4. The results of the study could be biased by the individual backgrounds and experiences of the jury of experts.

5. This was not a feasibility study that prioritized guideline elements, but rather it identified trend-related guideline elements for planning schools to be used as needed by practitioners.

Definition of Terms

Architect

This is the individual who listens to and gathers information from the school board, administrators, faculty, students, and other interested parties and tries to effectively comprehend their wants and needs. This person then transforms these ideas and educational specifications into creative design solutions that reflect the desires of the participants (Hill, 1984, pp. 4-5).

Educational Specifications

These are the programs of educational requirements that are presented to the architect and contractor; they describe an overview of the project and "specific space needs by stating intended activities, size of groups, building services, and user-relationships to other spaces" (Engelhardt, 1984, p. 20).

Educational Trends

Castaldi (1987) asserted that better-planned, more usable facilities would naturally occur by the careful study and scrutiny of trends in educational innovation. He averred that "Clues gleaned from a study of the present trends should be amplified and imaginatively projected, so that the schoolbuilding of today can be designed with special features that will facilitate the incorporation of unforeseeable educational practices some time in the distant future" (p. 164). Thus, educational trends would be those innovative practices in any educational area (curriculum, planning, designed spaces), which will allow planners to better formulate parameters for future educational facilities.

Facility Planner

Earthman (1987) described this individual as one who is "most knowledgeable of the trends that affect education as well as the latest changes, innovations, and movements within education" (p. 20). Very often, this person implements the ideas of others. The facility planner must be on the educational cutting-edge in order to effectively aid in the planning, design, and implementation of school facilities.

Global Trends

There has been a remarkable awakening of global consciousness throughout the world, even among children. According to Kaywell and Carroll (1988) individuals and nations have begun to realize the 'interconnectedness' (p. 12) of all actions in the world. As citizens of a true global community, individuals (of all ages) must be taught to see the long-term consequences of their actions. Problems and solutions must not be thought of in isolation, without regard for the rest of the planet. Global trends are those conditions and happenings that will, at some time, impact the life of all world citizens. These trends further enhance the belief that "the fate of all things on the earth--its people and its resources-- are inextricably linked (p. 13).

Guidelines

These are non-definitive policy statements to be used to advise and council practitioners on a general course of action in planning future school facilities (researcher's definition).

Owner

This term refers to the school district that owns the site for the facility. The owner hires the architects and planners to whom they are ultimately responsible (Engelhardt, 1984, p. 19).

Trend

For the purposes of this study, a trend shall refer to a direction of a dominant movement revealed by statistical process (Webster's, 1989, p. 1052). An educational trend, shall be described as "the study and analysis of education and facilities literature and research findings about future educational possibilities. Application is usually made to all types of educational situations by means of case analysis, special studies, the preparation of reports, field studies, and facilities investigations [definition modified]" (Office of Education, 1969, p. 173). For the purposes of this research project, trends are to be understood as innovative movements determined by professionals and based upon sound empirical and scientific evidence (Author).

Site

This term refers to the land on which a single building or complex is located (Brooks, Conrad, & Griffith, 1980, p. 179). This is a very important concept because the site of a facility is integral for what happens inside and outside the building once it is constructed. Also, the site is one of the first impressions that the general public has of the school.

Societal Trends

These would be trends in the societal areas, such as marriage, the family unit, drug use, divorce, work patterns, child care, and social needs. Any remarkable change in these types of areas usually begins as a small ripple in the pond but as Hodgkinson (1991) noted, both society and education have many leaky roofs that are closely related to "the spectacular changes that have occurred in the nature of the children who come to school" (p. 10). Societal trends are the polestars upon which many school planning programs must be aligned.

User

The users of a facility are all the parties that will ultimately use the building, such as students, teachers, administrators, staff, and community members (Engelhardt, 1984, p. 19).

Procedures

The purpose of this study was to identify significant global, societal, and educational trends and, on the basis of this research and information, develop a set of guidelines to be used by practitioners in planning future public school facilities.

Subproblem one

To trace the historical, philosophical, and architectural development of school facilities and to identify significant educational trends that might impact upon future school facilities planning. A review of the literature was undertaken at the East Tennessee State University library with special attention given to the historical perspectives of schools outlined in many facilities and educational administration texts. The library housed a collection of The American School Board Journal which dated back to 1930; this was especially helpful and enlightening in regards to past historical developments in American public schools.

In looking at the area of trends, once again a thorough review of the literature was undertaken with special emphasis on futuristic literature sources dealing with educational trends. The Educational Facility Planner, one of the foremost, authoritative journals in facility planning, was reviewed for the last six years. This journal had a wealth of information on futuristic planning, and it was valuable in contacting and corresponding with experts in the field of facilities planning.

The on-site visits to inventive, futuristic schools, which have received national prominence, such as the Saturn School for Tomorrow in St. Paul, Minnesota, were very beneficial in examining educational trends that had actually been implemented and were currently in use at those facilities. By telephone calls and correspondence, interviews were arranged with architects, facility planners, principals, administrators, and technology experts who are currently heavily involved in the planning, design, creation, and implementation of innovative school facilities. An interview guide was designed and pretested before being presented to individuals (see Appendix A).

ERIC data bases were used and provided myriad sources for journal articles on the history of school facilities. Many of these articles were obtained through the East Tennessee State University Inter-Library Loan department. Additionally, on-site visits to 10 public schools in Washington County, Tennessee, provided an in-depth look at the representative architectural patterns in school facilities for the past 80 years. It was also significantly beneficial to accompany a county physical plant administrator on several school facilities surveys. This experience proved to be an excellent way in which to learn about the construction patterns and inner workings of school facilities, which have been built at many different times.

Subproblem two

To establish guidelines for planning future school facilities. On the basis of a review of the literature and the identification of educational trends that had been forecast by futurists and educational planning specialists; by interviews with architects, planners, principals, and administrators; and by on-site visits to innovative futuristic school facilities, a set of proposed guideline elements was formulated.

Subproblem three

To validate the guidelines established in subproblem two. The guidelines, which were established from a review of the literature; interviews with architects, administrators, principals, and noted authorities; and on-site visits to high-technology schools, were presented to a jury of 13 facility planning specialists in order to secure their evaluation and to determine the validity of the guidelines. Each of the guidelines was rated independently by members of the jury according to the following scale:

Code	Guideline Rating	Explanation
5	Essential	A element that would be necessary in planning future school facilities

4	Highly Desirable	An element that is not absolutely necessary but would be of functional value in planning future school facilities
3	Significant	An element not necessary but would have some functional value in planning future school facilities
2	Little Significance	An element holding little value even though its presence would not harm the planning process
1	Not Applicable	A element which would have no value in the planning process

The jurors were further requested to recommend guidelines not listed and to include them in their ratings. Those guidelines securing a mean value of 4.5 or better were declared essential. Guidelines receiving a mean value of at least 3.5 but less than 4.5 were considered highly desirable. Any guidelines that received a mean of 3.0 but less than 3.5 were considered significant. Those guidelines that received a mean value of less than 3.0 were considered by the investigator to be of little significance and not included as guidelines.

Organization of the Study

The study was organized into six chapters:

Chapter 1, Introduction, included the statement of the problem, purpose of the study, significance of the study, research questions, assumptions, limitations of the study, definitions of terms, procedures, and organization of the study.

Chapter 2, Historical Review of the Philosophies, Objectives, and Architectural Patterns of Educational Facilities, and Synthesis of Significant Trends provided a review of the literature on past and present educational facilities. This chapter took the form of a historical resume of the various philosophical approaches and objectives related to the chronological progress of educational facilities. The architectural patterns of school facilities were examined and studied. The second section of this chapter presented and discussed the various trends (global, societal, and educational), which might possibly shape the course of the design and planning of future educational facilities.

Chapter 3, Procedures and Methodology Development encompassed the development and design of the study.

Chapter 4, Guideline Development, entailed the selection of the proposed guideline elements for planning future public school facilities, which were developed from the identified trends and sent to the jury of facility planning specialists for their ratings.

Chapter 5, Guideline Ratings, presented the guidelines for planning future school facilities that were rated by the jury of specialists.

Chapter 6, Summary, Findings, Conclusions, and Recommendations, contains a summary, summary of the findings, conclusions, and recommendations.

Chapter 2

Historical Review of the Philosophies, Objectives, and Architectural Patterns of Educational Facilities, and Trend Synthesis

Introduction

This chapter was divided into two sections according to the delineation of the subject matter. The first section investigated the historical patterns of school facilities in an attempt to show how they have philosophically and architecturally evolved through time. The second section continued in the historic vein by examining numerous global, societal, and educational trends that could possibly have some impact upon the types of educational facilities that may be planned and constructed in the future.

Historical and Philosophical Background

Individuals of every age feel that the innovations and developments that take place their time are exemplary and futuristic, until these are surpassed by ideas and inventions that seem to dwarf them in greatness or imagination. Educators are guilty of "re-inventing the wheel" more often than other professions, simply because they are so quick to forget about the past while inventing the future. Pulliam (1987) acknowledged that "much of what is regarded as new or innovative in education has a long historical record" (p. 2). Educators and planners are also chided for relying too heavily on the past for fear of the unknown future (Naisbitt, 1982). There is something to be learned from both past and future studies. Everyone must accept the inevitability of what Toffler (1980) called "exploding change" (p. 8). To be mired in the past, resisting change, can be a devastating experience. On the other hand, to assume that one can learn nothing from history, is equally foolish. Simply because our world is bombarded with exponential technological change, does not mean that a study of the historical and philosophical foundations of education and educational facilities should be precluded. Pulliam (1987) once again asseverated that "It is the significant forces, movements, ideas, and conflicts which shaped the American school system that are vital to the comprehension of the present" (p. 3). Lowe (1991) also advocated that "to understand the rationale for school house planning requires an examination of the historical perspective from which this rationale has evolved" (p. A2). Crowell (1989) admonished both educators and planners not to lose sight of our past or future directions: "We need to appreciate where we have been and how we got here. The challenge of a new way of thinking is not a call to abandon cherished values that have provided meaning and direction" (p. 63).

The purpose of the first section of this chapter was to examine the chronological history of school facilities and to attempt to demonstrate how they have been guided, in both positive and negative ways, by the educational philosophies prevalent at that particular time in history. It was anticipated that by looking at the guiding principles and the roots of educational facilities and by tracing their evolution, practitioners could become more informed and single-minded in their attempts to create newer facilities which utilize the positive lessons and do not replicate the negative ones. It seems appropriate that researchers and planners must have a clarity of vision concerning the past, and develop an imaginative, focused vision for the future without being tethered to any of the educational paradims that resist change.

Architectural Development of School Buildings

The school building as a structure to house students has not always been in its present form. According to Castaldi (1987), "Prior to World War II, school buildings were not viewed as specialized public buildings. . . .[They] were simple, nondescript buildings . . . .[and] were generally utilitarian structural envelopes that simply protected teachers and pupils from the elements" (p. 7).

Architecturally Castaldi listed three broad periods in the history of schoolhouse design: (a) the Hellenistic and Roman era, (b) early American and post-Civil War period, and (c) the 20th century (p. 7). For the sake of a smoother chronological sequence of events, these larger periods were further broken down into distinct subperiods (with approximate dates) when applicable later in this chapter. It was the intention of this section of the chapter to begin with the earliest periods of school architecture and trace the roots of both the design of the actual buildings and the educational philosophies and principles that aided in their evolution.

Hellenistic and Roman Periods (500 B.C.-100 B.C.)

The school as a "structure" was not evident around 400 B.C. when Plato was a disciple of Socrates--the school at this time was not a physical facility but wherever the teacher chose to be. Very often the teacher selected a quiet spot beside the coolest part of a temple in the open air (Castaldi, 1987, p. 9). Despite all the beautiful Greek and Roman structures, none were designed specifically for education, except for the gymnasium or palaestra where students were instructed in gymnastics. Educational spaces around 100 B.C. evolved slightly, as it became culturally acceptable to educate boys; some Greek and Roman schools were held in ordinary rooms on a space available basis. The educational tools, supplied by the student, were sparse but considered adequate: baked earth alphabet plaques; waxed tablets and styli; a counting board made of different colored pebbles for thousands, hundreds, tens, and units; quills, ink, and papyrus; and simple musical instruments, such as a lyre or flute. There might be a chair for the master and a few benches for the students, but "the meeting place of the pupils and teacher was incidental to the instructional process" (Castaldi, 1987, pp. 10-11).

Thus, it is evident that the schoolhouse, as a distinct facility, was a nonexistent entity at this early stage of the educational history. As crude as these situations seemed, very little changed in educational facilities architecture until the Early American Period (17th century).

Early American Period (1607-1775)

Knezevich (1984) noted that localism and a stalwart democratic spirit permeated the New England frontier, and this rugged self-determination and independence was mirrored in the types and designs of schools that emerged in these geographical areas. New England schools were a reflection of the theocratic state and the deeply permeated religious sectarianism of their colony (p. 166). The chief rationale for educating young people in Colonial America was primarily religious in nature where "education became an instrument for social control through transmitting and preserving the beliefs of the sect" (Pulliam, 1987, p. 18). The colonists were not so much interested in children who could read and write, as in children who could be taught obedience to their parents and the Bible in order to gain salvation (Lowe, 1991, p. A2).

Lowe (1991) emphasized that the "Responsibility for the education of most colonial children rested within the hands of the church" (p. A2). Pulliam (1987) indicated that religious sectarianism ruled almost from the beginning in part because of the failure of the government to support education with tax revenues. Concerned parents wanted their children to be scripturally educated in the beliefs of their unique sect, so the underpinnings of education rested most heavily in the hands of the educated clergy. Therefore, many early schoolhouses were built and financed by individual church organizations. The independence of the religious sects and their very strong feelings for "local control" over the educational destinies of their children resulted in most colonial children being educated in church-controlled schools with very little supervision from the central civil government (p. 20). The author concluded that "In a very real sense the desire for greater religious freedom contributed to the doctrine of church and state" (p. 20).

Due to the adamant religious beliefs of colonial parents, "church buildings served to accommodate educational activities as well as religious functions. As time progressed and communities expanded, the one-room schoolhouse became the most common means of housing educational programs" (Lowe, p. A2). The Pilgrims had insisted that education be the responsibility of the parents. In 1642 Massachusetts passed the first Compulsory Education Act. To add credence and force to this act, in 1647 the General Court also passed the infamous Old Deluder Satan Act which "required every town to set up a school, or that it pay a sum of money to the next larger town for support of education" (Pulliam, 1987, p. 33). To further make the point of their educational intentions crystal clear, the first property tax for local schools in America was passed in Dedham, Massachusetts in 1648. The stage was set for public financing of school buildings (p. 33).

Another unique New England invention was the "moving school." In order to keep the administrative responsibilities and guardianship for schools within the town meetings, while at the same time serving children outside the immediate area, townspeople selected a roving schoolmaster, or moving school, who traveled on a circuit with his books and equipment. Rooms were rented in private homes around the circuit, and they became temporary schoolhouses. This idea was used extensively in the town of Harwich, Massachussetts, which in 1725 had a total of six such rented schoolhouses; it took the schoolmaster about three years to complete the circuit, which meant that the children received vacations of more than two years (Knezevich, 1984, p. 166).

New England schools as facilities. Castaldi (1987) suggested that the early New England school buildings were architecturally much less beautiful than their Greek forbears. Whether it was the schoolmaster's home, a church, or a hastily constructed one-room schoolhouse, the facilities were given little thought other than to provide shelter for the students. Architects were never even considered for structures whose basic purpose was utilitarian, straightforward, and unimaginative. The typical American schoolhouse was "a simple structure--usually one large room with a fireplace at one end and windows at the other. . . .The schoolhouses were frequently crowded, poorly ventilated and drab, and equipped with a whipping post" (p. 13). The schoolhouse was also furnished with rudimentary furniture: roughhewn, hand-made benches without backs, long tables for the pupils to write on, and a raised podium for the teacher (p. 13).

These log cabin or clapboard schoolhouses were envisioned merely as shelters where the teacher and student could meet. No thought was given for the comfort or convenience of either party, and the facilities were as rough and solemn as a New England winter. The whipping post was prominently displayed by the door, so that children could never lose sight of this no-nonsense means of discipline (Pulliam, 1987, p. 34). Pulliam further detailed the severity of the Puritan punishments: "Severe floggings were administered for misbehavior or breaking the rules, since the Puritan philosophy called for literally beating the Devil out of the child" (p. 34).

The school materials consisted of a hornbooks, crude slates, quill pens, and rough unlined paper, most of which had to be supplied by the students themselves. Books were even more scarce with the two most common being the New England Primer and the Westminister Shorter Catechism (Pulliam, 1987, p. 34). The following description is typical of the New England school routine:

> The school normally operated six days a week, except in the summer. There were long periods of prayer and Bible reading both morning and evening. Most of the subject matter was memorized by the student and tested in a cue and recitation session before the master. There were no group activities or mass assignments. Students were not encouraged to express opinions or ask questions. The word of the master and the text were regarded as absolute authorities. Teachers had no pedagogical training as such, but in New England the school masters were among the best educated members of the community. The pay was extremely low and many

> communities required masters to 'board around' in order to save money. (p. 35)

Many children entered these schools at age 6 or 7 and often only stayed 3 or 4 years (Pulliam, 1987, p. 35). More advanced students went to the Boston Latin Grammar School or schools similar to Benjamin Franklin's Academy, a vocationally-oriented school (p. 30). Pulliam (1987) further stated with assurance that "the seeds of the American comprehensive high school were planted in the private and parochial schools of the Middle Colonies which offered vocational subjects" (p. 30).

Schools in the South. Schools in the South during the colonial and national period were of four types: (a) plantation schools, where wealthy planters hired private tutors for their sons and daughters; (b) old field schools, a unique Southern invention, were merely elementary schools built by a community on a fallow or old field no longer useful for farming; (c) dame schools, which were taught by women in their homes; and (d) a few Latin grammar schools based upon the same type schools in New England (Pulliam, 1987, pp. 24-27). Pulliam (1987) noted that the

> most conspicuous thing about education in the South was the lack of public interest in schools. . . .It was strongly believed by the dominant planter class that each man was responsible for the education of his own

> children. Further, it was against the prevailing custom to tax one person for the education of the sons of others. (p. 27)

Then, as now, local control decisively determined the extent of support for public schools. It goes without saying that the facilities based upon such a philosophy could not benefit the student in more than a incidental manner.

Post-Nationalist Period (1776-1861)

Heady with the liberating influences of the Declaration of Independence, Americans during the Post-Nationalist Period tended to envision educational opportunities as a concurrent condition that would naturally follow the new egalitarian premises of our nation. After the Revolutionary War in 1776, America became incensed with the liberating ideas of men like John Locke and Jean-Jacques Rousseau. The expanding frontier and the Industrial Revolution drastically changed the needs of Americans (Pulliam, 1987, pp. 43-46). The education of America's young people was constitutionally placed squarely in the hands of the states by default because as Pulliam succinctly asserted, "It was the prevailing view of the founding fathers that while knowledge was the best guardian of liberty, education did not belong in federal hands" (p. 56).

The impetus to build more schools was given a vigorous thrust with the Ordinance of 1785 and the Northwest

Ordinance of 1785 which gave large amounts of federal land for the maintenance of public schools, and as Knezevich (1984) astutely noted, "It was federal support of public education <u>without undesirable strings attached</u>" (p. 226).

Lowe (1990) outlined the metamorphosis of the structural nature of the emerging schools:

> Schools changed as America changed. The schools kept pace as the country progressed from an agricultural economy to an urban industrial society. . . . These changes were reflected in the organization, size, and pedagogy of the schools. While this evolutionary process of American life has determined the structural nature of our schools, there is little evidence that consideration was given to how the building should accommodate learning. (p. A2)

Knezevich (1984) reaffirmed this idea by adding that "the one-teacher school attendance unit was an organizational pattern that reflected the simple educational fare and limited educational expectations of a rural and pioneer society" (p. 324).

Pulliam (1987) concluded that "The rising tide of democracy threatened a dual system of education in which the elite enjoyed good schools and the masses were largely ignored" (p. 44). In 1779 Thomas Jefferson first proposed to the Virginia Legislature that all children should be educated at public expense, but it was to take almost three-quarters of a century before this "radical" idea could be fully implemented in Massachusetts in 1852. Even then, "as late as the 1880s the law had to be enforced in some towns by militia who marched children to school under guard" (Fulghum, 1990, p. 90).

Lancasterian school. Because of the need, especially in large cities, to educate larger masses of people inexpensively and efficiently, the arrival of the Lancasterian Monitorial school system from England was a boon to education hungry Americans, who now began to feel for the first time that "schooling was a mark of achievement and a step up the social ladder" (Pulliam, 1987, p. 58).

Based upon an English education concept, the first Lancasterian school appeared in New York City in 1806. Joseph Lancaster had developed his inventive pedagogical concept using the catechism model of teaching. The Lancasterian system "demanded the regimentation of a well-disciplined military unit, using one head or master teacher to instruct fifty assistant teachers who, each in turn, passed on the instruction to ten students" (Council, 1969, p. 11). Lancaster, who viewed comfort as "an unessential element to proper educational techniques, "saw his method as the most efficacious manner to teach 500 students (p. 11).

In the case of the Lancasterian model, the schoolhouse facilities were designed for the maximum number of students to be processed in the most effectual manner, with little or no thought for creature comforts:

> [The] classroom facilities constructed to house the system were designed to accommodate great numbers of students of every grade and achievement level. It was not unusual, in city schools, to have 500 students seated in a single 50 feet by 100 feet room. The use of benches rather than desks allowed the room to accommodate one student for each 10 square feet of space. (Lowe, 1991, p. A2)

The Lancasterian model was very possibly one of the first serious attempts to design and streamline the system of mass education in America, and it survived for approximately 35 years (Council, 1969, p. 11). Gilliland and Womack (1973) concluded that the Lancastrian system "had something to do with establishing the idea of public education for all pupils, thus helping to convince the public that a system of public education should be extended and given financial support at the local level" (p. 257). Lowe (1991) concurred with the above statement and additionally stated that the Lancasterian system had a substantive impact on the development of the American educational system because its "rationale established principles of group instruction and education for all children and provided a basis for the free tax supported public schooling we have today" (p. A2).

Henry Barnard and Horace Mann were visionaries and seminal influences in the field of education who believed that schoolhouses should offer children a better way to learn and grow. Men like Barnard and Mann were largely responsible for the mind-boggling idea that "facilities were more than shelters" (Lowe, 1991, p. A2). Between 1820 and 1850, they were instrumental in the hard fought battle for free public schools in the United States (Castaldi, 1987, p. 15).

Mann, who had grown up and been educated in the roughshod Puritan schools of Massachusetts, saw the dreadful, almost inhumane, conditions in the schools of all the surrounding states. Enrollments and attendance were low, and children, who ranged in age from 3 to 18 years, were herded into shoddy facilities like cattle. Students were often instructed by teachers whose credentials and educational attainments were little better than the students that they tried--often ineffectually--to teach.

A report from the Albany, New York School District contained a litany of complaints concerning teachers who were "'low, vulgar, obscene, intemperate, ignorant, profane, and utterly incompetent'" (Kaestle, 1990, p. 70). In 1837 Mann began his campaign for better public schools and "led the first successful school-reform movement in the United States" (p. 70).

Bare bones schools. In spite of the stalwart convictions of Barnard, Mann, and other spirited educators, schoolhouses in many areas of our country remained spartan, one- or two-room structures with little or no thought for the student or instructional program. One New York superintendent in 1844 described his impression of the schools that he visited:

> 'The total number of schoolhouses visited and inspected by the county superintendent during the year was 9,368 of which 8,795 consisted of one room only. The number of these schools having no privy is 6,432 and the number that contained no suitable desks, etc., is 5,972. The number lacking in proper facilities for ventilation is stated at 7,889. It is in these miserable abodes of accumulated dirt and filth, deprived of wholesome air, or exposed without adequate protection to the assaults of the elements, with no facilities for necessary exercise or relaxation, no convenience for prosecuting their studies; crowded together on benches not admitting of a moment's rest in any position, and debarred the possibility of yielding to the ordinary calls of nature without violent inroads upon modesty and shame; that upwards of two hundred

thousand children, scattered over various parts of the state, are compelled to spend an average of eight months during each year of their pupilage.'
(Lowe, 1991, p. A3.)

Barnard's contributions to schoolhouse design. The indomitable genius of Henry Barnard made him the exemplary educator of his day, and nothing that he advocated was stronger than his principles of design for schoolhouse facilities. By 1855 more than 125,000 copies of his book on school architecture had been distributed in nine states and parts of Canada. The "common schools," which were in vogue during this time, "had the teacher seated at a desk located on a central, raised platform designed to accommodate one child after another as they approached to recite from memory or text" (Lowe, 1991, A4).

Because of Barnard's book on schoolhouse design and construction, superintendents and school officials were given the opportunity to understand what he considered the essentials of good schoolhouse planning: "Location, size, method of construction, ventilation, heating, furniture (seats and desks), teacher arrangements, instructional materials, the library, yard and external considerations" (Lowe, 1991, p. A3). As bad as conditions were in many areas, Lowe concluded that "No period in the history of American education has spawned greater changes in the nature and functionality of educational facilities" (p. A4).

Largely due to the efforts and vision of Barnard and Mann, the educational reform movement in America took root and gathered momentum. Like the public furor for change, schoolhouse facilities were on the brink of new designs and better ideas.

Mann's contributions to the graded school. Knezevich (1984) remarked that "the graded system of instructional organization was the most significant educational innovation of the mid-nineteenth century" (P. 324). Horace Mann apparently made a special visit to Prussian Volksschule and was fascinated by their extensive curricula and grade classification of students. Knezevich further documented that "the eight-grade common school of Prussia was adapted and became the model for the eight-grade elementary school organization in the United States (p. 325).

The Quincy box. As America grew, educators and administrators looked for innovative ways to handle the influx of new students, and a "concern for a better educational program led to development of the graded plan with equal sized classes" (Council, 1985, p. A-2). The Quincy Grammar School, the first fully graded school in the United States, was built in Boston in 1847 at a cost of $60,210.18 (Lowe, 1991, p. A4). The "egg crate" or "collection of boxes" arrangement of the rooms made its construction a watershed experience in schoolhouse facilities. Architecturally, it was so inventive and advanced for the time that proponents felt that it could not be improved upon. They were correct in the sense that from about 1850 to 1900 the "Quincy Box," as it became known, was the most ubiquitous elementary school in cities across America (Lowe, p. A5).

It was especially popular because it adapted easily to the drill-content teaching style that was so prevalent during this time period, and administratively it functioned efficiently (Lowe, 1991, p. A4). Hoy and Miskel (1991) pointed out that, unlike the larger, Quincy-type schools, "the one-room schoolhouse of rural America did not need specialized administrators" (p. 1). Even though many rural schools remained one-room facilities, the majority of schools were designed after the Quincy model, and its popularity has survived throughout the 20th century.

The Quincy School was an astonishingly simple and pragmatic way to house 660 pupils:

> [It had] four stories, a basement, and an attic. Located on the fourth floor was an assembly hall, that with the use of benches, could accommodate the total enrollment of the school. The other floors were divided into four separate classrooms of equal size [a total of twelve classrooms]. Each classroom was 31

> feet by 26 feet (806 square feet) and housed 55 students. The major change in these classrooms was the provision for individual student desks, bolted to the floor in seven rows of eight. This arrangement provided much more comfort to the students than did the boards that served as benches in the typical one-room schoolhouse. The instructional methodology of this time, which required pupils to sit and listen to the teacher, and, on occasion stand beside their desks and recite, was well served by this arrangement. (Lowe, 1991, pp. A5-A6)

The Quincy Grammar School was both a response and a solution to a problem. As America's population burgeoned with immigrants and the industrial working class, it became necessary for schools to be able to group and educate students effectively and efficiently, hence the development of the graded organization. This was one of the most dramatic examples of school architecture changing in response to a specific need (Gilliland & Womack, 1973, p. 257).

Egalitarianism and free public schools. Prior to the War of 1812, education was almost purely a religious enterprise in the theocratic New England States. After this transitional time, and until the Civil War, the country witnessed the emergence and rebirth of the educational linchpins known as the elementary or common schools. The strong sectarian hold on the schools slowly but inexerably became more secular in nature (Pulliam, 1987, p. 65).

The time period between 1812 and the Civil War has been called the "age of the common man" (Pulliam, 1987, p. 66). During these years, Americans began to strongly champion egalitarianism and to demand a universal free education for their children. Many reformers hoped that education would be the magic elixir that could improve many of the egregious problems created by the Industrial Revolution. America at this time was filled with an increasingly peripatetic populace composed of immigrants, transplanted farmers, and especially children who began working in New England mills as early as eight-years-old (Pulliam, 1987, p. 67). In the urban areas, slums and poverty were all too familiar faces. Because of the reform movements which stressed the social conditions and educational needs of the millions of children, "the belief that [common] schools must be both free and tax supported developed into public policy before the Civil War" (Pulliam, 1987, p. 68).

The common school revival was that time in our nation's history when the New England concept of a free universal common education began to be accepted by the rest of the country. Common schools were now seen as institutions that could enculturate the immigrants, teach basic skills, and instill the ideas of morality and democracy in all students.

Pulliam (1987) concluded by suggesting that "the battle for free public education, supported and controlled by the state, was centered around the common school" (p. 70).

Post-Civil War Period (1865-1899)

The Civil War wreaked havoc on our nation as a whole and most especially in the South. Many schools and churches were used by the soldiers and burned or destroyed in the conflict. As a consequence, the Reconstruction Era saw the development of many new schools in the Southern states, and additionally, the school architecture also changed at this time. (Lowe, 1991, p. A5).

Lowe (1991) also indicated that "in the construction of school buildings, wood gave way to brick and stone as the preferred building materials. Controlled heating systems replaced wood stoves and indoor spaces for recreation were provided" (p. A5). In general, the rough, hand-planed, bone-numbing benches began to be replaced with desks of various sizes (p. A5). It would be irrational to believe that schools all over the country continued to move forward in an orderly, more modern fashion--they did not. Some areas of the United States were very slow to accept any real substantive changes in schoolhouse design, as exemplified by the description of a Kansas "corn-crib" school:

'Because each year was expected to be the last, the schoolhouse had slipped into disrepair and listed to

> one side on its foundation of cracked limestone. The building was about the size of our corn-crib, large and peeling-white, with sparrows' nests straggling from the eaves.' The pupils crowded into such schools ranged tremendously in age. In one room there might be five- and six-year-olds painfully studying their first McGuffey reader next to a twenty-year-old studying--often with equal pain--his last. Scholastic standards were not high. (Watkins, 1981, p. 30)

The seeds of Progressivism. The changes in education began to vigorously take on steam beginning with the famous Kalamazoo Supreme Court decision of 1872 which virtually guaranteed a free, tax-supported public education system, including high school, for all of America's children (Pulliam, 1987, p. 99). Pulliam also saw the "period between the Civil War and the First World War [as] the era for the development of the modern American school system" (p. 91). He went on to posit that "by 1873 laws for the organization of a state school system, including the school tax and some form of state control, were to be found all over the nation" (p. 91).

Dewey, Pestalozzi, and the kindergarten. When a compulsory attendance law was passed in Massachusetts in 1852, the stage was set for the other states to follow suit (Pulliam, 1987, p. 67). Another important educational event very quietly unfolded in 1856, when Mrs. Carl Schulz, a former pupil of Froebel, established the first American kindergarten in Watertown, Wisconsin; unfortunately only German was spoken there. Elizabeth Peabody, another education pioneer, quickly followed suit and established the first English-speaking kindergarten in Boston in 1860 (Pulliam, p. 81).

The progressive methods of John Dewey and Pestalozzi were quick to gain popularity in this country, especially by forward-thinking educators who welcomed the child-centered approach to learning over the harsh, regimented, autocratic methods of the past. Not only did the progressives' methods influence the children, but they effected schoolhouse buildings also: "The kindergarten, with its emphasis on the individual and his development as a social being, quietly started the trend to unbolting furniture from the floor and changing the whole concept of space use, storage, and equipment" (Council, 1985, p. 11). Along with this new view toward the importance of the individual learner and child growth and development, class sizes in schools began to go down from "over 50 pupils to the lower 30s" (Lowe, 1991, p. A5).

Ozmon and Craver (1986) reported that it was men, like the pragmatic educator and wide-angle visionary John Dewey, who fought for flexible and functional facilities in the public schools. Many inventive ideas such as movable furniture, furniture sized for children, folding walls, an activity curriculum, and large print books were the result of the genius of Dewey who tested many of his ideas for educational innovations in his experimental school (p. 115).

As educators began to espouse the instructional methods of progressivism, they began to realize that what Dewey called 'sitting and listening schools' were completely inappropriate for the freedom and movement inherent in Pestalozzi's principles of learning (Lowe, 1991, P. A5). Lowe further elaborated upon how this attitudinal change transformed the nature of the school:

> As the emphasis upon particular needs of growing children continued to expand, the necessity for functionality of design in schoolhouse architecture became apparent. This gradual transition in theory gave rise to a movement that considered school facilities as a place where children could 'live as children' rather than as a place where the total objective was on preparation for adult life. (p. A5)

Many of these ideas of the progressivism philosophy were field tested in the experimental schools, such as the Horace Mann School, the John Dewey Laboratory School in Chicago, and the Spayer School at Columbia University (p. A6).

<u>Confluence of ideas: Form versus function</u>. Castaldi (1987) avowed that "no evidence of any distinct relationship

between schoolhouse design and architecture appeared until the latter part of the nineteenth century" (p. 14). The author went on to illustrate that the school facilities that were built, improved upon the creature comforts, but the designs had little or no reflection upon the nature or functions of the school. During this rather unimaginative time sequence, Castaldi (1987) added that schoolhouses were "designed as architectural works of art rather than as educational facilities . . . [and they] were outsized buildings, characterized by unfunctional and undifferentiated space organization and unfunctional and noncreative design" (p. 14).

Secondary schools continued to broaden their curricula in an attempt to provide vocational and manual training for those not going to college. The public schools also added physical education, science, and commerce courses for the college bound students. These increased programs brought with them the concomitant requirements for larger facilities in which to house them. There were also movements afoot to upgrade the standards of training and certification of teachers (Pounds & Bryner, 1967, pp. 67-68).

Gilliland and Womack (1973) concluded that these newer, creative educational programs, with their increased emphasis upon the use of the out-of-doors as a learning environment, also "stimulated changes in buildings, giving greater emphasis to planning a facility to implement the educational program" (p. 258). Improvements in the design of facilities were evident in more flexibility of the teaching spaces, improved lighting, furniture, and equipment (p. 258).

The Early 20th Century (1900-1945)

The 20th century ushered in a plethora of exciting new educational concepts by men like Dewey and Col. Francis Parker. The first half of the century was destined to be a series of jack rabbit education starts, where many new ideas were touted, placed into practice, and eventually fell into disuse when another more highly publicised plan came along. Nevertheless, school buildings became more complex in both size and function, as they took on more varied curricula and added new spaces to accommodate these new services.

Dewey and many of his colleagues realized that American public schools "had become stagnant--lifeless bureaucracies for the educators and stultifying memorization factories for the children" (Kaestle, 1990, p. 73). An inauspicious pediatrician, Joseph Mayer Rice, was partially responsible for the beginnings of the second school reform movement that began in 1892 and carried over into the new century. Dr. Rice traveled around the United States to 36 cities and documented the poor quality of the schools, bringing to the public's attention the aimless and amorphous manner that children were being educated. The real beginnings of the progressive educational movement had finally taken a firm hold (Kaestle, 1990, pp. 72-73).

Scientific efficiency and growth. Early in the new century, schools began to grow in size, complexity, and numbers in response to a new wave of programs and demands from society (Council, 1985, p. A-3). There was an air of efficiency in the country spawned by the actions of captains of industry. Many educators, who religiously endorsed this philosophy, felt that schools could be run as expeditiously and functionally as a manufacturing business (Kaestle, 1990, p. 74). Following these industrial models of efficiency, schools were designed to be mirrors of society. In attempt to become synchronized with and emulate the scientific managerial methods of men like Frederick Winslow Taylor, the public schools tried to run an assembly line technique of rigid instruction, inflexible curricula, and stop watch schedules (One-Size-Fits-All, 1989, p. 27).

New physical education spaces. World War I had a dramatic effect upon the public schools because many of the men who applied to serve in the military were turned down for their poor health. This situation was part of the impetus for the federal involvement in education; the other being to give substantial amounts of money for school vocational facilities. The unsound condition of America's men provided "a stimulus for major changes in the construction of educational facilities" (Lowe, 1990, P. A6).

Playing fields, swimming pools, gymnasiums, and playgrounds were evident all across the United States as the country began to place more emphasis upon the health of its students and physical education spaces (Lowe, P. A6). The first public school baths were installed in Scranton, Pennsylvania, in 1905, and during this time period, builders now began to install showers in many of the newer facilities as a common practice (Bowers, 1967, p. 48).

New spaces for programs and services. The early 1900s also witnessed the beginnings of a new public awareness that the health of the child was partially the responsibility of the public schools; as a result spaces were created for school nurses and health clinics. As the curricula expanded with new courses for science and commerce, physical and vocational education, and as community use of schools increased, so too did the space demands and the complexity of the schoolhouse facilities. (Lowe, 1991, p. A6; Pounds & Bryner, 1967, p. 69).

Gilliland and Womack (1973) stated that "new approaches to education stimulated changes in facilities, emphasizing that the building is designed to implement the educational program" (p. 258). Building designs now reflected, more than previously, an openness inside the facility with more adaptability of spaces for both large and small groups

(p. 258). The early 1900s also saw the openings of the first junior high schools and the beginnings of general science courses in secondary schools (Council, 1969, p. 11).

Architecturally, this was a rather uninspiring time when spaces had increased, but "much of the Victorian facades had disappeared, leaving only neutral brick structures that were functional but less than inspiring to student and teacher alike" (Council, 1969, p. 11). Castaldi (1987) also concurred with this assessment and added that during this time schools assumed a more generic character of "large boxes enclosed by red brick walls and covered by a steep slanted roof" (p. 16). The author also stated that during this period "neither the architects nor the educators really had a clear understanding of the educational tasks to be accomplished" (p. 16).

<u>Cafeterias and school lunches</u>. Another significant facet of the school facility that had slowly begun in the early 20th century was the evolution of the supervised school lunch program which had first originated in Boston in 1894 (Blackston, 1966/1967, p. 17). In 1912 there were 40 cities in the United States with supervised school lunch programs. The real impetus for these plans came about as a result of the federal programs in the Depression of the 1930s under the Civil Works Administration and the Federal Emergency Relief Administration. These agencies provided

not only money for free lunches and milk for needy children, but also dollars for construction of desperately needed school facilities (Blackston, 1966/1967, p. 17; Council, 1985, p. A-3). According to Knezevich (1984), the National School Lunch Act of 1946 solidified earlier lunch programs and made the school cafeteria an integral and valuable permanent part of most school facilities' designs (p. 228).

The Depression slowed down the building of public schools. Following that, the advent of World War II also contributed to a period of very slow growth and change in America's public schools (Pounds & Bryner, 1967, p. 69).

Crow Island School-Winnetka, Illinois. In the main, this era was a time of insipid, ineffectual architectural designs for schoolhouses. The construction of the Crow Island School in 1941 began a quiet revolution, and "school design has never been the same" (Pearson, 1991, p. 91). The design of this school had such a tremendous impact upon future school facilities that it is "widely regarded as the most architecturally influential school in the United States" (ASBO, 1991, p. 44).

What made this particular facility so unique was that it established a new architectural paradigm for school building design: "The two-story Victorian box housing rigid classroom cells and scaled to impress parents (and intimidate children) was swept away. Buildings imprinted with an institutional stamp gave way to ones with a more residential feeling" (Pearson, 1991, p. 91).

Some of the innovative and even brash (for that time) design concepts utilized at Crow Island were the result of a progressive educator and pioneer of developmental education, Superintendent Carlton W. Washburne. For example: (a) The school was all on one floor, as opposed to the common four-story Quincy box shape; (b) it was organized into classrooms on three wings, so each could have its own identity; (c) ceilings were lowered to nine feet versus the old 12-foot height; (d) many, if not all, of the classrooms opened directly outside so that children would have access to the outside world; (e) the school contained lots of windows that were also built lower to a child's height; and (f) in general a more relaxed environment that maximized contact between classrooms and the outdoor environment (p. 91). Christopher (1991) also lauded and affirmed the avant garde nature of the Crow Island School design concept:

> [There were] self-contained classroom units which were as self-sufficient as possible. Each of them [had] a minimum of two free outside walls for windows, its own restroom, work areas, and large support facilities. The environment that was created was friendly, warm, and hospitable. It has performed well for fifty years and will continue to do so for many years in the future. Each of the spaces [was] tailored to the needs at hand

> and also flexible enough to accommodate other activities. (p. 11)

The Crow Island School is an excellent reminder that visionary facilities can be created and last well into the future--this one has lasted 50 years, and it continues to reap accolades for its versatile and tractable design features.

Post-World War II (1946-1980)

This era in our educational history could best be described as a roller coaster race. Administrators had to build new school facilities fast enough to keep up with a record population of baby boom students. Years later, when the student enrollments dramatically dropped, administrators had to find viable uses for these same facilities.

The 1950s. Following the malaise in school facilities growth prior to World War II, a new growth period began again in the 1950s, as witnessed by an increase in school buildings that attempted to fill the need for spaces for new educational programs. The only provisions for flexibility of spaces were the use of some non-load bearing movable walls, folding room dividers, and very small amounts of movable furniture (Hilliland & Womack, 1973, p. 258). Architects with vision began to break out of the old paradigms and design school facilities that reflected new educational philosophies of movement, activities, and experiential learning (Council, 1969, p. 11).

One monumental architectural change was the abandonment of the multi-story Quincy "box" design in favor of single-story, longer, rambling schools based upon the cluster, finger, and campus plans. These structures made wide use of new types of plastic, glass, and concrete, and most were flat roofed structures. The designs also reflected a greater evidence of the architect's attempts to cater to the needs of the instructional programs; inside the facilities were filled with more instructional and teaching aids, and newer furnishings out of wood and plastic. The exterior grounds of the schools also evidenced new, standard recreational and athletic fields (Council, 1985, pp. A-3-A-4).

The 1960s: The age of diversity. The 1960s began with a bang. The launching of the Russian space satellite, Sputnik, on October 4, 1957 jolted Americans. This technological breakthrough shocked the nation and made it evident that its schools' science and math programs must be strengthened (Kaestle, 1990, p. 78). As a cosequence, in 1958 the National Defense Education Act was passed which "bolstered math, science, and foreign-language training at every level" (p. 78). Earlier in 1954, the Supreme Court desegregation decision of Brown v. Board of Education had merely been a ripple on the pond which would take almost 10 years to be fully felt in the schools (Pulliam, 1987, p. 124).

The influx of the first baby boom students started to flow through the public school system in the mid-1950s, and by the 1960s the schools were starting to feel the pinch of expanded enrollments. This was a frenzied time, when school administrators tried different methods to build schools quickly enough to meet the enrollment demands. Unfortunately, many of the facilities were like the so-called California Models. These were the infamous 30-year "throwaway" school buildings which were built "Bigger, Faster, and Cheaper" (Gardner, 1987, p. 24). According to Lowe (1991), "the sixties spawned a boom in schoolhouse construction with the trend being more space for student movement, activity and individualism (p. A6).

Architects try to open schools to the outside. As mentioned earlier in this chapter, after World War II, many architects tried to break away from the old paradigms of schoolhouse construction with new inventive ideas. Many novel designs sought to open up the visual spectrum of the classroom and to bring the outside inside. Unfortunately, in addition to a wonderful expanse of vistas, these large, capacious "window-walls" allowed unusual amounts of heat to build up in the school building during certain times of the year, along with extreme amounts of glare. The large-scale use of window space, coupled with long expanses of exterior "finger walls," would ultimately cause serious energy problems to school systems and create other exigencies in the energy-strapped 1970s (Castaldi, 1987, p. 17).

Schools become quieter and more comfortable. As Gilliland and Womack (1973) articulated, changes in the new educational programs, services, methodologies, and philosophies of the 1960s forced architects and school planners to also make concurrent changes in school structures and spaces (p. 258). Greater flexibility of spaces was recognized as a primary need. This design concept was fulfilled by means of open space class rooms, many of which used "furniture as visual dividers in teaching spaces instead of sound retarding, operable walls" (p. 258). Because of these types of changes, doors and permanent walls were virtually eliminated (p. 258). Visual dividers and movable furniture made the arrangement of the rooms or pods more non-limiting to the teacher. All blocks and barriers to learning were removed in an attempt to make the learning experience flexible and innovative (p. 258).

Indoor environment. For the first time, many schools began to be climate controlled with improved HVAC (heating-ventilating-air conditioning) units that allowed students to study, concentrate, and learn in more comfort. Carpeting became a standard item in many schools, where it served to reduce the noise level and also as an aesthetic enhancer for the facility. Based upon the way students learned, school facility designers attempted to regulate the environment in positive ways that would augment both comfort and achievement. Flexible schedules and team teaching appeared during this time, and "the concepts of self-direction, spontaneity, and individualization gained prominence, and schools changed accordingly to emphasize open, colorful, comfortable, and flexible spaces" (Council, 1985, p. A-4).

The 1960s were also a time of experimentation in the design of the systems or modular approach for school facility construction. In an effort to build schools faster and more economical, a movement towards this approach, using prefabricated or "stock" components, began in England shortly after World War II. In the United States, the emphasis turned to the development of "stock" building plans for schools. The answer to efficient, less-costly construction seemed to be in the formulation of the School Construction Systems Development (SCSD) which was launched by Ford Foundation's Education Facilities Laboratory early in the 1960s. This system offered schools a way to have high-technology structural, lighting, HVAC, and partition systems faster and less expensively for construction of their facilities (Council, 1985, p. A-4).

The 1970s: Enrollments peak and experiments begin. The spiraling enrollments of baby boom students of the 1950s and 1960s finally peaked at a record of about 48 million students in 1971 (Snyder, 1988, p. 26). Administrators and planners got their first full taste of the "roller coaster effect" of enrollments. In the 1960s communities could not build school facilities fast enough to meet the demand; then in the 1970s these same districts found themselves with more buildings than they needed, as enrollments slowly dropped once again (Keough & Earthman, 1984, p. 13).

The debilitating energy shortage of the early 1970s caused architects and school planners to look more closely at the design of the schools they were building. Because of their vast numbers, it was documented that "school buildings in the developed countries of the world [were] perhaps the leading single users of energy outside of transportation and industry" (Council, 1985, p. A-5).

Air conditioning had become more commonplace in many schools, but that convenience and the large "open window" designs only exacerbated the existing energy shortage. As a result of these and other myriad factors, architects and planners experimented with the controversial "windowless" schools. These schools proved to be more energy efficient but not as popular with students and teachers who seemed to prefer more windows and natural light (Castaldi, 1987, p. 17).

A brief summary of the educational accomplishments of the 1970s would have to include: (a) A realization of the energy shortage and the need to conserve energy in school facilities; (b) a search for utilization of old school facilities; (c) attempts to provide for new barrier-free spaces for special students as a result of PL 94-142 passed in 1975 to allow equal educational services for the handicapped in the "least restrictive environment"; (d) opening up the school to more community activities and adult education programs; (e) and "an overriding concern was the continuing move to humanize the educational environment" (Lowe, 1991, p. A7).

The Current Period (1981-1992)

This space of 11 years can probably best be characterized as a time of both actual and anticipated education reform movements. Enrollments were still in a decline, and budgets seemed to be constrained almost to the breaking point. Equity of school facilities and programs had been a smoldering issue in many states, some of whom sought solace in the courts. Alarmingly, enrollments began to creep slowly upward at the same time that administrators realized the poor conditions of their aging facilities.

Today's public school facilities are an amalgam of designs and appearances. If you go to any given city of approximately 50,000 people or more, it is possible to see schools of every size, age, and description represented. You would likely see schools that were: (a) Built in the 1930s in the classical two-story box shape; (b) flat-roofed "finger schools" of the 1950s; (c) glass-expansed and open-classroomed schools of the 1960s; and (d) the windowless, energy conservative schools of the 1970s. Every city and town probably has some of these types of facilities represented. This brings up a very critical question. Is it possible to ever find the "right" school facility that will fulfill all of the various and sundry needs of a school district? The answer is--it's very difficult. This answer should only serve to encourage planners and educators to try harder and think creatively. It must be realized that when a facility is built, it must be designed and built with even greater care and foresight than ever before. Schools cannot be given back, once they are built. They usually reamin as a visual educational reminder in the community for a long time.

<u>Wolves bark at the door</u>. It is important to look at the number and condition of our present school facilities, before designing and planning new buildings for the future. At this moment, the most up-to-date guide to the conditions of our country's public school facilities is the Education Writers Association report published in 1989, entitled <u>Wolves at the Schoolhouse Door: An Investigation of the</u>

<u>Conditions of Public School Buildings</u>. Based upon a sample of approximately one-half of the public school buildings in the U.S., here are some of the alarming statistics from that publication on our nation's school public buildings:

1. Twenty-five percent of our nation's school buildings are shoddy places for learning. They lack sufficient space, suitability, safety, and maintenance for the students and teachers (p. 1).

2. An additional 33% are only considered adequate--growing enrollments and more deferred maintenance could quickly lend them inadequate (p. 1).

3. The remaining 42% are in good condition, but these good facilities make an even more glaring statement about the stark differences in school buildings even in the same state (p. 1).

4. More than 50% of today's schools were built in the 1950s and 1960s; many were cheaply and rapidly built, and designed to last only about 30 years. Delayed maintenance, flat roofs, and poor quality building materials places these facilities in an "at-risk" category (p. 2).

5. Enrollment trends are projected to rise at least until the next century. Some Midwestern states may remain stable, while others project huge enrollment increases: Florida may need 816 schools in the next 10 years, and California projects a need for 800 schools by 1993 (p. 2).

6. Alarmingly, in 1991-92 only 39% of the projected

school needs for construction and renovation will be met.

7. A corollary problem to increased enrollments is the need for expanded spaces to comply with federally mandated programs which often require more than average amount of space. An example would be the low pupil-teacher ratios necessitated for special education classes, which must often be separate classrooms requiring up to triple the amount of space necessary in regular classrooms (p. 2).

8. Few districts have the resources or know how to do effective long-range or innovative planning that would aid them in more cost-effective and efficient facilities; as a result "these districts risk repeating the mistakes of the past" (p. 2).

9. "Nationally, not even a marginally adequate data base about schoolhouse facilities exists" (p. 3). Complete, thorough national surveys are necessary to adequately understand and assess the needs and conditions of our school facilities.

10. Very few states employ facilities experts, even though they spend millions of dollars on school construction. Florida employs 55 persons in its facilities offices, while other states have only one (P. 3).

11. The uneven distribution of resources and planning capabilities, creates tremendous inequalities in the facilities environments among children, sometimes within miles of each other (p. 3).

12. Of the 25% of the buildings which are inadequate, 43% are obsolete, and 42% have environmental hazards (p. 4).

13. The replacement cost of our nation's 88,021 public school buildings is estimated at $422 billion (p. 4).

14. The education infrastructure estimates are $84 billion needed in new or retrofitted construction and $41 billion in repairs and maintenance (p. 4).

15. Sixty-one percent of our public school facilities were constructed during the 1950s and 1960s (with 30-year life expectancies); 20% are older than 50 years; and only 6% were constructed during the 1980s (p. 4).

16. Based upon what school districts will spend, experts believe that we may be approaching a 'new golden age of educational construction' (p. 5).

17. Fifteen states anticipate more than a 5% growth of students at the doorstep through 1992 (p. 5).

These statistics seem to indicate that our present public schools will need massive amounts of money in order to provide spaces for the students in the next 20 years. The facilities that we presently have are a hodgepodge of architectural designs and educational philosophies. At our projected enrollment growth rate, and the slowness with which new facilities are being built to replace worn, outdated, and unsafe schools, many administrators feel that the problem will be a thorny one.

State Superintendent of Instruction Herbert Grover estimated that at the present rate, it would take 400 years to replace all of Wisconsin's public school buildings (Education Writers, 1989, p. 8). Superintendent Grover also incisively added a caveat: "'The state is spending more money to provide safe housing for its 5,600 prisoners than it has for its 760,000 school children'" (Education Writers, 1989, Introduction).

Where we go from here in our schoolhouse planning, may very well depend upon a consideration of the things that have been done in the past, the advances we have recently made, and our aspirations for what we really want for our children and our country in the future. Some of the following examples display the type of inventive, forward-thinking design ideas that educators and planners must exemplify, if they want to seize the opportunities for educating our future generations of schoolchildren.

The Future (1993-2222)

Robert D. Williams (1990) of the California State Department of Education described his plans for the schools of the future: "The goal of the 'Schools for the 21st Century' document is to encourage local school planners to think and broaden their approach to school facilities design by applying a greater vision of what future school facilities could look like" (p. 20).

In thinking about what types of schools to design for the future, we have several models that are currently being tried, which seem to offer the best hope of achieving maximum success in our future educational endeavors. Many of these schools were built and designed as experimental or pilot facilities in order to test design concepts and educational programs. Some of them may work beautifully, while others may not be as successful, but it is important to examine several of these schools that are ahead of their time and see what they have to offer. Perhaps this will give educational practitioners a greater insight on planning future school facilities.

The Saturn School of Tomorrow

The first futuristic public school that comes to mind would have to be the newly opened Saturn School of Tomorrow in St. Paul, Minnesota. Al Shanker, President of the American Federation of Teachers, first challenged Minnesota educators to think seriously about a radically new school that would take the best and most innovative ideas in education and put them to work on a grand scale, in one place, at one time. This bold, new, adventuresome school was dubbed the Saturn School of Tomorrow, based upon the General Motors Saturn plant approach to technology and quality (Bennett & King, 1991, p. 41).

One of the guiding principles for the design of the Saturn program was Ted Sizer's incisive comment on applying small treatments to school settings. He said, "'Things remain the same because it is impossible to change very much without changing most of everything'" (cited in Bennett & King, 1991, p. 41). With this concept in mind, St. Paul Superintendent David Bennett and Project Director Tom King decided to pull out all the stops to create and "develop a re-tooled, transformed, completely redesigned school in which virtually every student could and would learn" (Bennett & King, p. 41).

From the very beginning, Bennett and his staff knew that in order to make the school succeed, they would need the help, cooperation, and collaboration of everyone--teachers, administrators, board members, parents, community leaders, and business/industry partners. Working with tight budgets and even tighter timetables, the Saturn School of Tomorrow opened in a temporary location on September 5, 1989 (Bennett & King, 1991, p. 42). The school has since moved to its permanent, downtown St. Paul location in the first five floors of a remodeled YWCA building. Here are some examples of the innovative, trend-fulfilling educational programs and ideas that the Saturn School is trying:

1. As a choice, magnet school, Saturn is a fine example of the trend towards parental choice schools for their children.

2. The students at Saturn are being taught in a "textbook free environment," where students and teachers design the breadth and depth of many of their courses (beyond their core courses). For example, when a certain group of students wanted to take a course in chemistry, the school worked with the Science Museum of Minnesota to develop a special introductory course for the Saturn students.

3. Each student will develop his own Personal Growth Plan (including goals in both cognitive and wellness areas) based on a proficiency portfolio that becomes a permanent part of the student's record. There are no letter grades or report cards, nor set times for class periods.

4. All parents must become stakeholders in the Saturn School, which is composed of a 40% ethnically diverse student body and a 15% special education segment. Parents are not only stakeholders, but they work integrally with teachers to design, teach, and provide resources for the rich course offerings.

5. The Saturn campus doesn't stop or start at the door. The entire community, business, and industrial segments are fully used as off-site learning campuses. The St. Paul Public Library, just down the street, acts as a partner and shares its facilities with the school, thus saving the expense of a main library in the school. As stated above, the Science Museum of Minnesota and the

Minnesota Museum of Art work in tandem to give students access to wide-ranging, off-site, culturally diverse, experiential learning opportunities with little or no cost to the school.

6. The Saturn School is high-tech in every possible way. Relying on many of the high-tech local industries, this school employs state-of-the-art learning technologies: robotics, computers, Logo/Lego systems for computer programming and mechanical skills-building, videodisc (Videodiscovery) systems for video libraries and source materials. Saturn also utilizes the comprehensive computer-assisted instructional systems from Integrated Learning Systems which allow the students to view a videodisc and respond by computer to the teacher's monitor, where further individualized instruction may be given.

7. This innovative school is also a high-touch and high-teach environment. It emphasizes team learning concepts based upon cooperative planning of innovative and experimental activities where students can learn to think both independently and in a group. Teachers at Saturn have learned that technology can be a valuable tool that empowers the teacher and allows them the freedom to work more closely with students as individuals and in groups.

8. The Saturn School is a site-based school that depends heavily upon empowered teachers, administrators, and parents to work synergistically together with conferences,

budgets, staff selection, and school governance.

9. Parents, community, and industry leaders are part of the Saturn informational and mentorship/apprenticeship activities for the students. For example, one parent with the help from community and industry leaders set up a cryogenics demonstration for Saturn students to give them a hands-on science experience in quick-freezing products.

10. The renovated facilities, which house the Saturn School, exemplify the trend towards: (a) smaller schools (they have about 300 students); (b) warmer, personalized, high-touch environments where students have cozy spaces for study, reflection, and socialization; (c) schools that blend in with their local neighborhoods and communities; and (d) partners in business and industry that use the facilities as community centers and places for instruction (Bennett & King, 1991, pp. 41-44). With its unique design and the implementation of so many highly researched educational concepts, the Saturn School of Tomorrow bears watching as an exemplary model of a good school design for the future.

Dr. Phillips High School-Orlando, Florida

Certainly, all the schools of the future will not, perhaps cannot, be as small as they would like to be. It is therefore important to examine a larger school (over 2000 students) and see just how this type of facility fits into future school planning. When it was first designed and planned in consultation with eight of central Florida's high-tech industries, Dr. Phillips High School was envisioned as "'an educational city of the future' whose diverse faculties and curriculums [sic] would prepare students for jobs (and life) in the 21st century" (Ficklen, 1988c, p. 34).

Dr. Phillips High School, the largest in Florida, was completed in August, 1987 at a cost of about $30 million or $70 per-square-foot (just slightly over average in Florida at that time). The seven-building, 350,000 square foot facility was designed for a 50 acre site just outside of Disney World. The enrollment capacity of grades 9-12 was to be 2,500 students, who were given a space allocation 140 square feet of space per student (compared to an average of 60 square feet per student in California schools). Unfortunately, even before the school opened, enrollment figures jumped by 250 students, and 10 portable classrooms had to be brought in (Ficklen, 1988c, p. 34).

An integral part of the total design package of the school was the use and implementation of the technological expertise that abounds in central Florida's space corridor. For example, Sea World helped to plan the marine biology center, while General Electric helped with the design and planning of the new sophisticated but expandable vocational education facility. Other technological industries aided in the design of a closed-circuit television studio, a robotics program, a computerized greenhouse, and other inventive, futuristic programs. Working together in collaborative partnerships, school officials and businesses were able to design curricula that will not only met the needs of the present but the future also (Ficklen, 1988c, p. 41).

The architectural design of the Dr. Phillips High School was, as you would expect, both regional and climate-based. The seven-building, open-air campus was especially designed to take advantage of the warm Florida breezes. Student lockers were all outside along the corridors under a broad canopy that allows good air flow but keeps out the rain and sun. The campus also centered about a huge, open-air commons area that served as an important zone for students to socialize, and it connected the hubs of the surrounding community-like buildings. Colors for the school were carefully and aesthetically chosen with cool ocean blues being dominant. All areas were highly landscaped with native trees and plants that give the school a lush appearance (Ficklen, 1988c, p. 35).

Fred C. Rohrdanz, Vice President of PDR Architects, stated that this facility was designed and built to take full advantage of today's technology, but also higher technology as it becomes available in the future--in other words, adaptability and flexibility were built in to the original design. New wings could be added to each pod at a later time, just as special cable trays were installed for future use with communications and technology updates (Ficklen, 1988c, p. 36).

Possibly, all schools of the future will not have to be this large, but Dr. Phillips High School does seem to offer a viable way to build larger complexes that will carry out the educational mission in a user-friendly manner.

Monolithic Domed Idaho High School

The Emmett, Idaho school district wanted to conserve energy costs and provide a quality environment for their high school students, so they chose a monolithic dome concept for their new facilities. The new Emmett High School consisted of five monolithic concrete domes of approximately 180 feet in diameter. Each dome was constructed around an air form, and three inches of polyurethane foam was sprayed on the inside of the balloon; a gridwork of pre-engineered steel was attached to the foam shell, and a seamless layer of high-density concrete was sprayed on in thicknesses of 12 inches at the top to about three inches at the bottom, thus creating a passive solar shell. The result was a cost-effective, ultra-energy efficient building that may save its owners 50-75% of heating and cooling costs.

According to most experts, the two most common complaints about schools are the leaky roofs and the heating and cooling systems--because of the high-tech design of the monolithic domes, these should not be a concern in the Emmett High School. The freedom of the dome design allows architects to express themselves with open space concepts and an unusual amount of interior flexibility for students and programs. Schools such as this would seem to offer alternatives worth considering for future school facilities (Smith, 1987, pp. 27-29).

As promising as all of these architectural designs and innovative concepts seem, planners and practitioners can not be content with what they have created thus far. Instead, new exigencies will require vast amounts of forward-visioning. As Williams (1990) quite explicity stated:

> The demands of a new century require a system shift, a new response to differences in peoples; a new focus for educational organizations, people, processes, facilities, and a fresh look at the purposes of education and the activities of schooling for students who know live in a 'global village.' (p. 20)

Summary

The purpose of this section of this chapter was to examine the interrelationship of both educational philosophies and facilities in a chronological format. If this was cogently illustrated, then the relation between these two areas was shown, so that the reader can now begin to discern how this evolutionary chain of events has become the warp and woof of the educational fabric. For almost 2000 years, our educational facilities were constructed for every practical purpose, save the most important one--to fit the educational program. It seems that as an institution, the American public school system has finally learned some valuable lessons in the design of schoolhouse facilities. In fact, the taproot of the design possibilities has yet to be reached. As a profession, planners must not remain in a continuous holding pattern, but instead show a purposeful commitment to exploring new paradigms for placing our school buildings on the cutting edge of change.

The intent of the second section of this chapter was to identify and examine societal, global, and educational trends that in all probability will impact upon some aspect of our educational facilities in the future. Specifically, this section of the chapter tried to specify the implications these trends will have upon the way we may design future school facilities in terms of: (a) size and allocation of types of spaces; (b) psychological, aesthetic, and behavioral considerations; and (c) adaptability and pliability.

Global, Societal, and Educational Trends

Introduction

The intention of this section of Chapter 2 was to examine various trends that seem to be taking place not only in society but in the educational arena also. This section also identified those trends that will most likely significantly impact upon the planning and design of our future public school facilities.

For example, everyone is aware of the tremendous influence that technology will have upon their lives, but how will it affect the spaces that are designed for the students of the future? Briefly, planners must try to design the high-tech, high-touch spaces that Naisbitt (1982) talked about. Among other things, this chapter encompasses trends in technology, planning, the size of schools, and the shapes of spaces within the schools, and attempt to determine their significance in future educational facility planning.

As Americans approach the dawn of the 21st century, they are bombarded with technology and innovative new ideas, which promise a way of life that may radically alter the way things have been done in our society and our schools (Naisbitt, 1982). Alley (1989) argued that "Futurists tell us that our future is determined by the choices we make today" (p. 124). How will these changes effect the current public school facilities? How can educators and facility planners try to design and build the most innovative, flexible, and functional school facilities for the future? Experience would suggest that before embarking upon any course of action, it might be wise to try and discern those trends (global, societal, and educational) that might have a substantial impact upon planning and building our future school facilities. Castaldi (1987) agreed with this method of study when he stated that:

> Obviously, we cannot plan for the future in a vacuum. We must grasp certain clues in the concepts and practices of today in order to imagine those of tomorrow. . . .
>
> School planners can prepare themselves for the task of planning for the unforeseeable by carefully analyzing present trends in educational innovations, their types and objectives. . . . Indeed, school planners should consider both national and international developments in their review of existing trends. (p. 164)

Vickery (1989) concurred and posited that as planners and practitioners, we must avoid knee-jerk reactions and "formulate more thoughtful policies based on research and consensus rather than the expediencies of the moment" (p. 67).

In 1967 Marshall McLuhan and George B. Leonard projected the world in 1989, as a place where "Future educators will value, not fear, fresh approaches, new solutions" (cited in Hunter, 1990, p. 99). These futurists [McLuhan and Leonard] also intuitively recognized that "the school--that is, an institute of learning confined to a building or buildings--can continue to hold a central position only if it changes fast enough to keep pace with the seemingly inevitable changes in the outside world" (p. 99).

Webster's defined the word trend as "a dominant movement revealed by a statistical process" as opposed to trendy which simply implies "fashion-following, or faddish" in nature (p. 1052). Successful educators and planners must attempt to discern what a true trend is and how to apply it to their planning paradigm, as opposed to something that develops into a fad and nothing more. Many experts caution that there are never any guarantees to any of our endeavors or futuristic recommendations (Apple, 1983; Ravitch, 1983). McInerney (1987) sagely countenanced that "speculation into the future is always a risky business" (p. 25). Roy Amara, a dedicated futurist and president of the Institute of the Future, admonished that "anything you forecast is by definition uncertain" (p. 2).

Shane (1990) advocated a proactive course of action and suggested that "our planning to shape better ways of life must be based upon a blend of interpretations of projections as well as or aspirations" (p. 11). The author went on to reveal that "thoughtful scholars very often have given us a reliable picture of things to come," which are often revealed in "current books, articles and statements" that "suggest contemporary trends that imply social, economic, educational, and diverse other futures" (p. 11).

Constantinos Doxiadis in Anthropolis saw great promise in "the created future--the spontaneous acts of creativity that provide shape and direction for the world to come." The author felt that "The future is rooted in the past yet is open to imagination and creative initiative" (cited in Crowell, 1989, pp. 60-63).

The following section will deal with international demographic trends and other global areas of change, such as worldwide population shifts, global interdependence, economic competition, bureaucratic organizations, dwindling energy resources, and rampant pollution. Each of these forces will ultimately have a forceful effect upon the planning paradigms for future school facilities.

International Trends

Change--What Does It Mean?

Toffler (1974) assured us that "Tomorrow will not replicate today" (p. 4), while Crowell (1989) was convinced "there is a growing recognition that our world is complex--indeed, chaotic" (p. 61). Administrators, principals, and planners can more proactively anticipate change and better prepare for the results of it, if they are cognizant of the demographic trends that are developing throughout our country and the world. By applying this knowledge to their future school planning, these professionals can make more informed decisions (Coleman, 1989). As Shane (1989) artfully articulated: "In view of the well-nigh incredible proliferation of change in global society and in our technologies, the inhabitants of this planet must supplement and extend our understandings of the new environments that surround us" (p. 4).

Worldwide Population Is Rocketing

Shane (1989) strongly advocated that the prescient educator study global and national developments that illustrated the kinds of changes that "we must become knowledgeable about and derive well-reasoned implications from" (p. 4). As planners and inhabitants on the spaceship Earth, no one can ignore the burgeoning world-wide population growth. The United Nations estimates that the world will contain 8 billion humans by the year 2025. The World Health Organization reports that AIDS has reached epidemic proportions not only in other countries, but in the U.S. which experienced a 72% annual increase in 1988 (Shane, 1989, p. 4). In the future, it is to be expected that the underdeveloped countries (lowest production rates and highest population growth) such as India and Mexico will fall farther and farther behind economically (Coleman, 1989, p. 5). Coates and Jarratt (1990) stated that most futurists (in this article 17 contemporary futurists were surveyed) "doubt the world's ability to build infrastructures fast enough to keep pace with population growth" (p. 27).

Global Interdependence

As all societies become more globally connected financially, economically, and technologically, it becomes an imperative to understand the languages, customs, and problems of all these neighbors. Coates and Jarrett (1990) declared that an even greater amount of global cooperation and multinational business and education ventures will occurr in the future (p. 24).

A Nation at Risk (1983) recognized that "The world is indeed one global village" (p. 7). Kaywell and Carroll (1988) reported that "recent polls have shown that among the young one of the most widely held values is that of contributing to an increase in the quality of global life" (p. 13). As previously cited, Williams (1990) charged practitioners and educators to plan more innovatively for the future students who are all a part of a "'global village'" (p. 20). It is imperative for all citizens not lose sight of our interconnectedness with all the facets of life on this planet, even in the environmental designs for our future school facilities.

Financial Problems

Our U.S. property has been financially "invaded" by countries like Japan, Kuwait, and Great Britain who purchased $165.5 billion worth of American property as of

1987. Most international countries, including our own, are experiencing a time of phenomenal, unprecedented national debt that threatens to collapse their financial infrastructures. In the U.S. the combined national debt has reached approximately $7 trillion (Shane, 1989, p. 4).

International Economic Competition

America is under an economic bombardment from many countries in the world that are struggling for survival and social and political stability. These countries, which are increasing in number, are rapidly pushing forward in an attempt to gain a piece of the world economic pie of manufactured goods. Since many of the new competitors have lower labor rates and larger populations, they are stiff competition for our country. Some futurists even envisage a new world order (Coleman, 1989, pp. 5-6) and an economic and military decline in which the U.S. will assume the role of an equal (Coates & Jarratt, 1990, p. 24). Darling-Hammond (1990) reported that "Our [U.S.] industrial base is changing rapidly, and U.S. economic dominance in the world market is waning" (p. 286).

Governments and Institutions

Most futurists seem to be in agreement that the inflexible bureaucratic organizations will be unable to handle the complex society of the future. It is anticipated that corporation and industries probably will assume a much greater role in governing functions and providing assistance to privatized society (Coates & Jarratt, 1989, p. 23).

Increased Complexity

Many futurists see our society heading for an unprecedented pinnacle of complexity, which has been brought on and exacerbated by increased bureaucracies and technology (Coates & Jarratt, 1990, p. 23). Many of the words used to describe daily life evince this Kafkian perplexity. The world today seems complex, stressful, dynamic, fast-paced, and chaotic. Donald Schon describes today's managers as 'managers of chaos' (cited in Shane, 1989, p. 61).

Improved Technology

Advanced technology in all fields may possibly be the driving force that will catapult society into an unprecedented era of change in the fields of telematics (telecommunications, robotics, computers), biotechnology in agriculture and health, and in revolutionary new materials for construction, production, and space (Coates & Jarratt, 1989, p. 23).

Dwindling Resources and Rampant Pollution

According to Coleman (1989), the more underdeveloped, poorer nations with the lowest production quotas will require greater amounts of resources for their bulging populations. Food and energy will be in even greater demand. Polluted water will cause this precious commodity to be in even shorter supply. Hazardous wastes, a global warming trend, overflowing landfills, a depleted ozone layer, and numerous other ecological crises will force societies to carefully scrutinize the way that they have been doing business (p. 5).

Some futurists predict that a global collapse is possible. This may be due in part to an early increase in the energy costs, followed by the depletion of oil as the dominant energy source in the next 20 to 50 years. Only then do they believe that we will begin searching for alternative energy sources in earnest (Coates & Jarratt, 1990, p. 23).

Trends in the United States

An Information Society

A Nation at Risk (1983) clearly enunciated that "learning is the indispensable investment required for success in the 'information age' we are entering" (p. 7). Both Alain Tournine's (1971) The Post-Industrial Society and Alvin Toffler's (1980) The Third Wave warned citizens that the United States had passed from an agrarian and industrial society to an information society. These forward-thinking books emphasized that this movement into the information age would transform not only what we learned but how we learned. In 1956 for the first time, the number of people processing production information exceeded the number of people who actually were doing the producing (white collar workers versus blue collar workers) (Coleman, 1989, p. 4). Futurists agreed that "the information society will demand new standards of literacy and competence" that will focus more on new creative thinking skills and less on rote memorization of facts (Coates & Jarratt, 1990, p. 24).

An Appropriate Tech Society

This was a futuristic idea proposed by Schumacher and Toffler in which the United States no longer tried to be competitive with other nations such as Japan. Instead, the nation would concentrate on "bringing resource demands in balance both with limited resources and environmental constraints," and also by shifting from "high mass consumption to high mass conservation" (Coleman, 1989, p. 6). In effect the U.S. would "balance the needs of people for work while conserving resources and the environment" (p. 6), and the economy would be based principally upon "renewable resources and non-polluting production" (p. 6). This would be the beginning of what Schumaker and Toffler called the "appropriate tech" society (p. 6.).

Aging Populace

By the year 2000, more than 13% of Americans will be 65 years old or older. Also, the average life expectancy will be 80 years in 2020. The aging of America will create new, unprecedented financial, housing, and health care burdens on the younger population.

More than $1 billion was spent weekly for Medicare benefits for America's aging population in 1988; of that amount, more than one-third was spent on terminally ill patients (Shane, 1989, p. 4). Darling-Hammond (1990) added to the grim statistics by observing that in the future, the population that must support and care for the "greying Americans" will be composed of "a shrinking number of young people entering the work force," many of whom "are--and increasingly will be--the children of immigrants, minorities, and the poor" (p. 287).

Population Growth in the U.S

Keough and Earthman (1984) revealed that the greatest projected population growth may come in the Western and Southwestern United States where the population may expand as much as 45% in the next 15 years; the Midwest will stay essentially the same, while the Northeast may decline. Growth in urban communities can best be anticipated in areas that have more affordable housing for young married couples (p. 14).

Women in the Workplace

Shane (1990) indicated that approximately 70% of all women were employed in the workplace in 1990, and of these a third had children five years old or younger (p. 12). Another important consideration of this phenomenon is that greater numbers of "working poor women" will be taken from the welfare rolls and placed in the workplace. As a rule, these women will be less educated and will require more support services in terms of child care and transportation (p. 12).

Keough and Earthman (1984) envisioned that more women in the workplace should clue school planners to place a greater emphasis on the need for day-care and after-school child care facilities, a need they feel could be met with "a multi-use designed school facility" (p. 13).

The Family Connection

The family unit, as it was portrayed on the television series with Ozzie and Harriet or Leave It to Beaver, is no longer. Hodgkinson (1991) stated that "the 'Norman Rockwell' family--a working father, a housewife mother, and two children of school age--constitutes only 6% of U.S. households today" (p. 10). Home ownership is declining in favor of rental property and low-cost housing (Shane, 1990, p. 12). Single parent families are becoming the norm--25% of our children lived in them in 1988 (Shane, 1989, p. 4). This number promises to reach exorbitant, endemic proportions, especially with African American and Hispanic children whose mothers never married.

According to futurist Marvin Cetron (as quoted in The School Administrator, 1990, October), if current trends continue by the year 2000, it is to be expected that: (a) 11% of white children will live with divorced mothers, (b) 42% of African American children will be living with a never-married mother, and (c) 17% of Hispanics will be living with a never-married mother (p. 31).

Rubin and Bogers (1991) stated that "Traditional families with two married parents accounted for only 56 percent of all households in 1989--a decline of 71 percent since 1970" (p. 11). The authors also explained that rising rates of pregnancy among teenage girls create more one-parent families, along with the concurrent need for additional support services in the schools and communities.

If school districts wish to try and keep these young children with children in school systems, they must strengthen their efforts to assure that child-care and health support services are accessible and user-friendly (p. 12). All of these alarming and glaring facts mean that schools "must prepare to serve 5.4 million more low-income children in 2020 than they did in 1984" (p. 12).

Information Processors and the Knowledge Explosion

In the years to come production workers will be replaced by "information processors and knowledge workers" (Cetron's Forecasts, 1990, p. 31) who work in knowledge industries to gather, analyze, process, synthesize, retrieve, and store data. By the year 2000, these workers will fill 43% of the available jobs. Many of these jobs will become very competitive and will be filled by part-time workers and "moonlighters" who find it necessary to secure two jobs to live comfortably. Flexible schedules (for work and school) will be necessary, and "day care will become the major fringe benefit of the 1990s" (Cetron's Forecasts, 1990, October, p. 31; Snyder, 1988, p. 27). Henchley (cited in Hathaway, 1987) concurred with Cetron and proceeded to forecast that "What land was to a pre-industrial society and money was to an industrial society, knowledge is to a post-industrial society" (p. 7).

The Latch-Key Phenomenon

Hunter (1990) advised that one of the most pressing problems facing both society and educators is the rising number of "latch-key" children who must go home to an empty home for two to three hours daily. The astounding number of these children, from homes where both parents must work, or from single parent or divorced homes where one parent works, is expected to be more than 45 million in the next few years (p. 103).

Hunter (1990) further explained that these children have formed their own social class that is being deprived of the very basic human needs as described in Maslow's hierarchy (p. 103). As a consequence, many of these children will probably be filled with feelings of insecurity, inadequacy, and confusion. He concluded by saying that "The 1990s will be the decade when this wave of latch-key children surges through the doors of the secondary schools, carrying with them the flotsam and jetsam of this heritage" (p. 104).

Minorities and Multiculturalism

According to Shane (1990), sometime around the year 2020 our country will have a new minority--the white Anglo-Saxon, European population. The majority will become the minority. Here is what can be expected in the future:

1. Presently in 53 of America's largest cities, whites are a minority in the school systems.

2. More than 15% of students in our school systems speak English as a second language.

3. Spiraling, high birthrates among Hispanics and African Americans will further divide the U.S. ethnically.

4. We will be challenged even more to provide a multicultural forum for expression in our schools (p. 12).

All of the above would seem to suggest that there will be an even greater need in our public schools for service organizations that can work with these problems within the environment of the school. Rubin and Bogers (1991) suggested not only the necessity for social support services in our schools for these children, but for teachers who have been adequately trained to meet the emotional and social needs of this new crop of multicultural, disadvantaged children who will deluge our schoolhouse doors in the next century (p. 12).

Changes in the Educational Arena

Enrollment Trends

Public school enrollments began to rise in the 1950s when the first group of baby boomers started their journey through the school system. During the 1950s and 1960s, schools were hastily constructed to meet the burgeoning enrollment figures which finally peaked in 1971 at about 47 million pupils. From 1971 onward the enrollments decreased to a low of 39.3 million students in 1984. These enrollments (presently at about 41 million) are expected to climb to about 46.5 million by the year 2000. By the end of the decade, enrollments in elementary schools are expected to top 33 million pupils, while secondary school enrollments are expected to increase 20%. Although presently stable, the trend in full-day preprimary education seems to indicate a greater demand for this service and child-care facilities. This anticipated demand will be due in part to the increased participation of women in the work force and the larger numbers of women who are returning to work more quickly after childbirth (Snyder, 1991, p. 6).

Public Schools

Even during times of enrollment increases, the total number of public schools in this country has decreased from more than 247,000 in 1930 to about 88,000 in 1990. Fewer than 600 one-room schools remain today out of 131,000 that existed 50 years ago. Many of these smaller schools have been consolidated into larger, more complex schools. Elementary and middle schools show the greatest growth in numbers of facilities and in student size; the average elementary school in 1989-90 has 441 students, up from 403 students in 1984-85. The average size of schools in the U.S. varies greatly from state to state with Florida averaging 716 pupils per school, while Nebraska averages 146 (Snyder, 1991, p. 8).

Teachers

During the enrollment declines of the 1970s, the number of teachers did not decline significantly. This fact was evident in part because of the increased staffing needs brought on by mandated government programs, special education, and bilingual services, all of which required a greater number of staff to facilitate the programs. The number of teachers reached an all-time high of 2.7 million in 1989, and it is expected that this number will continue to grow to about 3.2 million by 2001 concomitant with the anticipated increase in student enrollments and special programs. Teachers' salaries reached the apogee in 1990-91, when they averaged an estimated $33,300, a 26% gain from 1980-81 (Snyder, 1990, p. 7; Report on Educational Research, January 9, 1991, p. 2).

Class Size

The National Education Association data indicated that class sizes were falling, while pupil-teacher ratios were rising in part because of the increased need for speech, reading, and counselling specialists to handle special education and handicapped students. The U.S. Department of Education data from 1987-88 indicated that the median class size in an elementary school was 24, for a secondary school 22, and 17 in combined elementary/secondary schools. California had the distinction of having the largest median class size of 29, while Vermont had the lowest with 20 (Snyder, 1990, p. 8). The Report on Educational Research (January 9, 1991) indicates that by 2001, the elementary school pupil-teacher ratios will drop to their lowest levels of approximately 16-to-1.

Ravitch (1983) held that as a society, we are tending to a greater egalitarianism, which will require a higher quality, more equal education for all students, regardless of their handicaps or special needs. Many of these trends would seem to indicate the need for more specialized spaces in our schools for special people.

Revenue

According to Snyder (1991), sometime during the 1970s, "state revenues superseded local revenues as the primary sources of funds for public schools" (p. 8). The average state government funding now stands at 46.1% (Snyder, 1991, p. 8). In 1990 the U.S. Department of Education [DE] distributed $9.5 billion to the states for elementary and secondary education. Nearly 48% of these monies were in the form of Grants for the Educationally Disadvantaged such as Chapter 1 programs (Snyder, 1990, p. 8).

In looking back only two years, in 1988 the DE distributed an estimated $11.1 billion to the states in the following manner: (a) grants for the educationally disadvantaged 39%, (b) education for the handicapped 33%, (c) special programs and state block grants 10%, (d) vocational education 9%, and (e) school assistance in federally affected areas 7% (Snyder, 1988, p. 26).

Since the bulk of the federal government's monies have been for educationally disadvantaged and handicapped, schools probably should anticipate even greater numbers of these students who will require more costly space per pupil to service their needs.

Pupil Expenditures

The per-pupil expenditure for public elementary and secondary students rose at an adjusted rate of 28% in the 1970s. From 1980-86 the expenditure rose at an adjusted rate of 18% to a high of $3,752 in 1985-86 (Snyder, 1988, p. 29). The Report on Educational Research (January 9, 1991) indicates that by 2001, the per-pupil spending will jump 23% over the current estimated $5,140 (p. 2). Snyder (1991) revealed that per-pupil expenditures rose 36% in the last 10 years to an all-time high in 1990-91 of $5,266 (p. 9).

Disparity in Educational Funding

In July, 1989, the Kentucky Supreme Court declared the state's schools were unconstitutional; this dramatic, litigious movement was brought on in part because of the wide disparity of school funding throughout the state of Kentucky. "The far-reaching decision set in motion a fast-paced and dramatic redesign of an entire educational system" (Appalachian Educational Laboratory, 1990, p. 1). Since that time, other states have filed similar suits in an attempt to rectify what has become an all too frequent clamor among educators--that schools in certain prosperous sections of a state receive disproportionately higher amounts for education than other parts of the state with lower revenues. The ripple in the educational revenue pond made by Kentucky promises to take on tidal wave proportions, as other states face similar redesigns of their own imbalanced educational fiscal structures.

Declines in Educational Output

There seems to be daily outcries and remontrances from the public for more accountability. Students' SAT scores are falling along with equally poor marks and plummeting test scores in science and mathematics. Education costs have risen sharply and pupil-teacher ratios have declined significantly. Increased burdens and social responsibilities have been heaped on teachers and administrators who have been strapped for funding both new technological equipment and support systems for government mandated programs (Hathaway, 1987, pp. 7-8). In terms of educational facilities, research seems to indicate that these yawps can be be silenced by a more a stringent, thorough analysis of the types of structures that are built (Bowers & Hamons, 1990). If they are energy efficient, flexible, and convertible, the public will have a greater respect for the way their money is spent (Rist, 1989c, p. 33).

Additionally, and most importantly, research also indicates that the public stands solidly behind schools, which create safe, orderly, aesthetic environments that tend to raise scores and promote better self images (Christopher, 1991, p. 12). In short, parents like the schools that their children like, and they tend to be very supportive of schools that create better places for their youngsters to learn, explore, and relate to each other.

The Class of 2000

As cited in Hunter (1990), the 1987 issue of Children Today described and projected the 40-member high school graduating class of the year 2000:

1. Two class members gave birth before graduation.
2. Eight students were dropouts.
3. Eleven members will be unemployed.
4. Fifteen students are living on the poverty level.
5. At least 36 out of 40 these students will have used alcohol or drugs.
6. Six will have run away from home.
7. One will have committed suicide (p. 101).

These statistics do not include the numbers of abortions, rapes, attempted suicides, and cases of child abuse and neglect that take place in society each day.

Younger and Older Learners

As our society enters the information age, Boulding and Sicinsksi affirmed that education will be spread over the anticipated longer life span and become a function of the community (cited in McInerney, 1987, p. 25). By the year 2000, "75 percent of three-year-olds will attend nurseries (day-care centers or nursery schools)" (Cetron's Forecasts, 1990, p. 31). Many futurists (e.g., Brubaker, 1990; Gardner, 1987) strongly argued that the community school concept, where all ages and all members of a community are served, is not only a viable but a necessary one in the future. They envisioned the community school as "a learning center for adults as well as children, and a neighborhood culture, recreation, and fitness center" (p. 15).

The American Association of School Administrators (1976) probably said it best:

> Is it called a school if people come to one place to get needed health services, to enjoy recreational opportunities, to have children cared for, to inquire about employment or social security, to visit a library, to attend craft courses and to have their children go to school there? Or is it a new creation in which the school is an important, but only one of the elements? (p. 13)

At-Risk Students and Dropouts

The dropout rate in the U.S. school systems is approximately 30% (Shane, 1990, p. 13). Cetron (1990) wrote extensively that "One million youth will continue to drop out of school annually at an estimated cost of $240 billion in lost earnings and foregone taxes over their lifetime" (Cetron's Latest, 1990, p. 30). Because of more minorities, poverty, broken homes, single parents, latch-key supervision, rising poverty levels, drugs, and other societal problems, the number of "at-risk" students in the public school systems has risen dramatically in our society (Berstein, 1988, pp. 104-106; Hodgkinson, 1991).

America 2000: An Education Strategy

With the promise of a new educational era and the enthusiastic support of his new Secretary of Education Lamar Alexander, President George Bush launced his energetic new education strategy designed to set American students back on the right track to academic success and achievement. The four areas of concentration in the strategy are:

1. All 110,000 U.S. public schools must dramatically improve, and they will be individually held more accountable for the results of students' outcomes.

2. An entire New Generation of American Schools (at least 535 of them) for tomorrow's students of the 21st century must be invented by 1996.

3. Those adults in the workforce must become lifelong learners.

4. Successful schools must look to the communities and families for support as places where learning can happen (NASSP Newsleader, May, 1991, p. 1).

America 2000 is a "national strategy, not a federal program" (NASSP NewsLeader, May, 1991, p. 1) designed to restore pride and accomplishment in the American educational enterprise. If this crusade is to be truly successful, the schools planned for the future must also reflect that vision and be outstanding in design and construction.

Changes within School Facility Spaces

Introduction

All of the environmental and societal forces explained in the previous section will have their own direct impact upon the school as an institution. Concomitant with those forces are the changes that take place within the school facility environment itself. The schoolhouse is a much more complex institution than one might imagine at first glance. It is more than the sum of its spaces and rooms, furniture, and books. The school facility is the structure that must house and nurture the students and effectively carry on the educational mission of the school district. In order to be truly exemplary in effecting all these tasks, the planning, design, and construction team of the facility must attempt to assimilate all of the disparate needs into a structure that adequately fulfills the educational goals and mission of the district. Some of the prime considerations, which must be examined in designing a future school facility, are the following:

1. Short- and Long- Range Planning Concepts;
2. The Selection of the Planning and Design Team;
3. The Size of the Facility, Including the Site;
4. The Implementation of New and Innovative Curricula;

5. Psychological, Behavioral, and Aesthetic Considerations;
6. Regional Architecture and Climate-Based Planning;
7. The School/Community/Industry Partnerships;
8. Energy and Environmental Concerns;
9. The Design of the Facility: What Kind of Spaces?;
10. Effects of Technology on School Spaces;
11. Athletic and Recreational Aspects;
12. Support Services for Students and Community;
13. Flexibility, Adaptability, and Re-Use; and
14. Special Programs Within the School.

In an effort to investigate these issues, this study reviewed what specialists and experts in the field have determined to be the "driving trends" and "influencing factors" (Hathaway, 1987, p. 4) in the planning, design, and implementation of a school facility. In selecting the planning paradigms, which suit their particular needs, school officials and planners must think creatively with boundless clarity, and try to envision an innovative, cost-effective, energy-efficient, and malleable facility that will fulfill the educational needs of the community well into the 21st century.

1. Planning Trends

What kind of planning strageties must educators be cognizant of in planning their facilities, what types of planning should be undertaken first, and who should be involved in the planning team? Hathaway and Fiedler (1987) advised that practitioners must "plan and design educational facilities so they facilitate educational change and offer few, if any, constraints to the educational program" (p. 4). Castaldi (1987) warned that in planning school facilities, "Fads often impede leeway for change" (p. 169); therefore, educators must resist designs in the school facilities that "come and go" with the times (p. 169). Naisbitt (1982), voiced his concern over bureaucratic impositions of both power and ideas, and he cautioned that "Trends are bottom up . . . . Fads are top down" (cited in Gardner, 1987, p. 25). He further suggested that "Strategic planning is worthless unless there is first a strategic vision" (Cited in Gardner, 1987, p. 25).

If all of these things are true, how can school districts and board members know how to make the best possible decisions about what types of facilities they need to build in the future? Hunter (1990) indicated that a viable and valid source of information could be found in the "necessity for realistic educational planning not only for the immediate but also for the remote future" (p. 11). Gardner (1987) also strongly stated that the planning process is supremely important, but he also issued a caveat. He emphasized that the planning process must be placed not only in the hands of the professionals (e.g., architects and educators), but planners must place more information, knowledge, and power in the hands of the grass roots stakeholders of education, such as parents and community members. Gardner emphatically emphasized that the trends now indicate that planning must be bottom-up, not top-down. Another important area in planning suggested by the author is that it should never be based exclusively on "hard" data without an equal empathetic sensitivity for the "soft" data or human attitudinal and preceptional information from users of the facility (pp. 24-25).

The School Survey. According to Castaldi (1987), there are several important steps in a facility planning process: (a) A thorough examination of the present facilities in order to determine how much space is actually available and being used in a productive manner, (b) how well the education program is working, and (c) how the public feels about the services being offered. It is often most expedient and cost-effective for the district to hire a professional facility planner, educational architect, or educational consultant to help organize and carry out a pragmatic thorough study of all the facets of the educational program and facilities. If the district does not have on hand a recent survey, it is imperative to have one done before the planning process proceeds further (p. 69).

Castaldi (1987) firmly exhorted that "a school survey is the sine qua non of educational planning" and that "no school district can plan intelligently for the future without making a survey of its school system" (p. 69). The author proceeded to claim that the school survey gives the system an opportunity to see if their tax dollars are being spent efficiently and if their educational goals are being met (p. 69).

The school survey can vary in complexity and types, but each one is a specialized version of the well-known comprehensive school survey. Once again, according to Castaldi (1987), specialized surveys may be selected for several reasons: (a) Specialized surveys are less costly than the comprehensive survey, (b) the school system may only need information and data in one particular area, and (c) these surveys are often faster to complete and less costly to perform (pp. 77-81).

Types of school surveys. Once again, Castaldi (1987) delineated that there are several types of school surveys, each of which will be elaborated upon at length: (a) The first broad type of survey is the comprehensive school survey, and (b) the second type of surveys are the so-called specialized school surveys that involve community and pupil, finance, educational program, and school building surveys (pp. 77-81).

The comprehensive school survey. This survey is comprised of all the individual specialized surveys--it is broad in scope and quite definitive by nature. "It includes a study of the community and its population, business procedures, budgets and capital costs, educational programs, staffing and in-service training, board policies, and educational facilities" (Castaldi, 1987, p. 77).

Community and pupil surveys. These surveys are "concerned primarily with changes in pupil population and with the growth potential of the school district" (p. 77). By a careful analysis of geographical growth potential in the district, the population patterns of the community, and past enrollment trends and projections, the school district can more accurately predict its future needs in this area (Castaldi, 1987, p. 77).

The finance survey. This survey looks at every facet of the district's expenditures, cost of operations, and sources of revenue in an effort to spot both efficient and ineffectual financial business practices (Castaldi, 1987, pp. 77-78).

The educational program survey. This survey program examines the instructional materials and techniques, reviews the educational goals of the district, and sees to what extent they are actually being met. Ideally, this and the other surveys should be conducted by a team of outside experts and specialists who can look objectively at the school system (Castaldi, 1987, p. 79).

The school building survey. Castaldi (1987) argued that this was one of the most important surveys, because it often became the groundswell for further investigative surveys in a school system. The school building survey must by its nature also have access to the data from the other specialized surveys to be truly effective (p. 80). "The school building survey report contains an evaluation of existing buildings in relation to the educational functions desired by the school district, including a calculation of building capacities, a statement of unmet educational needs, and a recommended long-range building program" (p. 98). After the completion of this survey, the school district should know the extent to which the facilities can carry on the desired educational program.

The owners may also find out that they have wasted space that is not currently being used properly; if that is the case, then, less space will be needed in the new facility, and a budgetary savings will be realized. As Stanton Leggett (1985) convincingly argued, "Space is a resource that has been taken for granted, abused, accepted, used, fought over, more demanded and left vacant. Its effective use can contribute substantially to the accomplishment of the mission of the school" (p. 4). The results of wasted space can be quite substantial. According to Leggett (1985), one average size elementary classroom of 900 square feet provided, but not used for one year, costs about $14,750 or the average salary of a starting teacher in 1985 (p. 4).

Short- and long-range planning. Most of the experts (Gardner, 1986, 1987; Castaldi, 1987; Lewis, 1983) agreed upon the absolute necessity of both long- and short-range planning for a successful school building project. They were also in concert concerning the need to broaden the planning process, so that specialists such as facility planners or architects now become facilitators with a specialized expertise. Castaldi and other authorities felt that these groups should be encouraged to develop linkages with parents, community, and industries and to plan synergistically. In the final analysis, the experts agreed that planning must (a) totally involve every facet of the school and community, (b) be proactive rather than reactive in nature, and (c) be broad-based, bottom-up, and user-friendly approach to achieve success.

2. The Design Team

How does a school system go about selecting the design team for a new school project? Who should be included and who should logically be left out? Common sense would dictate that all the professionals gather together and develop the plan. This answer would only be partially correct. As previosly discussed, the planning team should be composed of representatives of all the members or shareholders of the school district. In actually gathering together the team that will design the proposed facility, the same guidelines apply. Design planning should be a broad-based, pluralistic-group concept, where each member works in concert with the others in a cooperative and collaborative manner (Gardner, 1987, p. 24).

For example, a design team would of course contain: (a) the architect, (b) member(s) of the school board, (c) teacher(s), (e) the principal if s/he has been selected, (f) the superintendent, and (g) a facility planner if available. What we have left out is perhaps 50% of the vital ingredients of a good design team--the other stakeholders in the school, such as: (a) the students, (b) school paraprofessionals, (c) staff, (d) parents, (e) business and community leaders, and (f) other professionals. Once this team has been selected, they should avail themselves to the community-at-large, so that they can solicit suggestions and inform the public of their ideas also. A broad-based involvement in planning will allow the community to feel that they have been actively and openly involved in the process (Weichel & Dennell, 1990, p. 19).

For the design process to be truly effective, it must place as much information in the hands of as many as possible to get good feedback of suggestions and ideas (Gardner, 1987, p. 24). The trend in planning seems to be to involve a qualified professional core (architect and/or facility planner) early in the planning process, in order that they may be involved in all planning phases. After board approval of the plan, the educational specifications are presented to the architect. Good, solid, definitive educational specifications are the linking pins of a successful project. Castaldi (1987) exhorted that "the greater the detail and clarity of the educational specifications prepared, the greater the likelihood that a school district will acquire the building that it really needs" (P. 143).

3. Regional Architecture and Climate-Based Planning

What architectural considerations should be given to the area of the country in which a school is built? For example, will generic school models work equally well in almost any part of the U.S.? The research seems to indicate that a high degree of consideration should be given to regional architecture and climate-based planning (Christopher, 1991; Brubaker, 1988; Bleke, 1988; Fricken, 1988a, 1988c).

<u>Regional architecture</u>. Regional architecture simply means that the architectural design of a school facility should reflect, as much as possible, the regional "flavor" of the surrounding environment. Christopher (1991) insisted that schools "should emulate the environment, growing from it, adopting the best attributes while improving the worst," and the school buildings should also "be an inspiration to the surrounding environment" (p. 11).

One should not even try to build the same school in Orlando, Florida as one does in Alfred, Maine--these two areas are geographically and culturally miles apart. Maine represents a homogeneous, conservative population that seeks to blend the beauty and stability of the New England architecture of the past with high-tech educational solutions for the future (Rist, 1988). On the other hand, Florida has a highly diverse, multicultural population composed of newcomers to the state; it is also one of the fastest growing school systems in the country. These districts are geared to ultramodern school designs, reflective of their space age technology-heritage, and they seek schools that will carry them into the 21st century like a Saturn rocket (Fricklen, 1988a).

Brubaker (1988) illustrated the idea of diversity, when he stated that "regionalism in school architecture is an important trend which calls for recognizing the unique qualities of the community and locale, and designing in context with these elements" (p. 6).

Magdalena School. A fine example of the excellent use of regional architecture would be the Magdalena (New Mexico) Municipal School. In this instance, the architects strove to design a school that was aesthetically comfortable with the surrounding environment and also relected the richness of the local culture in the materials from which it was constructed.

Magdalena School is situated in the picturesque backdrop of New Mexico's Magdalena Mountains in a sparse desert environment. The schoolchildren are predominantly Navajo Indians and Hispanic, so the architect sought to tie together the high-desert terrain with the beauty and colors of the native cultures.

The end result is a facility that stands uniquely by itself and also blends beautifully with the landscape. Choices of colors, building stone, and Indian and Hispanic motifs are all aesthetically blended to create a warm, unique cultural environment in which children learn (Fricklen, 1988b, pp. 34-35).

Climate-based planning. Climate-based planning implies that you should not take a design for a school building in California and automatically assume that it will work in Michigan. Architects like to lump overall school building design into two main categories: (a) campus plans for warm climates, and (b) compact plans for colder climates. The campus plan concept of design consists of a number of separate but related campus buildings that attempt to maximize use of outdoor spaces and windows--these plans are most effective in year-round warmer climates. The compact plan, most useful in areas with colder winters and four-season climates, uses a single, compact, multifloor building for energy efficiency and student convenience (Brubaker, 1988, p. 32).

The administrators of Forest Hills Central High School in Grand Rapids, Michigan, can tell you what happens when you build a school that is not climate-based planned because they did just that. Back in the 1950s, this suburb was grappling to build school facilities fast enough to meet the demand, so they sought the use of a generic designed school that had proved successful elsewhere--in this case California. The results were terrible. These school officials can attest to the fact that an open-air campus plan with free-standing buildings designed for sunny California does not work well in a cold four-season climate like Michigan.

They had problems almost immediately. Because of the blustery Michigan winters, the students walking outside between classes had to constantly carry their coats and snowboots, while slipping and sliding across the campus pavilion. It was impossible to keep temperatures in the individual classes even, and since some of the windows were single paned, condensation and heat loss were problems--students were slipping on the frozen moisture on the floors inside the building. Energy consumption was way above average. After about 30 years of constant headaches, the community knew that the facilities had to be replaced.

Luckily for everyone, a planning team composed of school and community members, administrators, and architects tackled the problem. By agreeing upon an innovative renovation project, a multistory addition was decided upon. Some of the schools original buildings were saved and woven into the new design concept, and the rest were razed. The final product speaks highly of the effectiveness of the group planning team concept. The new facility is 50% more energy efficient (because of higher levels of insulation, double paned windows, and a computerized energy management system) and designed for future expansion if need be. Good, colloborative planning turned this "California nightmare" into a functional, attractive educational investment (Bleke, 1988, pp. 35-37).

4. Size of the Site and Facility

What size facility does your planning team envision for the school district? Prime consideration must be given to the educational program that must be housed in the facility, but other forces such as budget constraints must ultimately be considered. Finally, is bigger really better, or do smaller schools really create better environments for our children?

The answer to these questions is difficult to pin down, simply because all the evidence is not in yet. Brubaker (1990), a well-known Chicago architect, posited that the labrynth-like mega-schools of 3000-4000 pupils were being seriously reevaluated; he saw the maximum, optimum enrollment being about 2000 students (p. 15). Brubaker (1990) also envisioned the public's concern for the individual smaller schools of 400-1200, which may have distinct psychological advantages in not making the student feel anonymous or lost in the structures. One solution to the problem, he suggested, was to design large schools like campuses with multiple buildings, which feel distinct and are connected to the larger whole.

Both Brubaker (1990) and Stanton Leggett, an educational consultant, agreed that students must have more 'space for individual learning' (p. 15) in schools. The architects felt that this can often be achieved by giving each student his own "special home base" (a homeroom-like base shared with five other students with an area for a computer, a place to write or draw, and a pleasant spot for quiet conversations) (p. 15). Benjamin (1982), in his study of 17 futurists, found a significant consensus among this group for trying to return to smaller schools in the future

(p. 212). Castaldi (1987) cogently noted that "contrary to popular opinion, large secondary schools are not less costly to operate nor are they free of duplication" (p. 142). The author felt that such mammoth facilities cannot be justified, except in high desity populations such as New York City (p. 142).

Another vital consideration in the site selection of a school facility might be the trend towards linking schools with parks. The "educational park" concept originated with Dr. Max Wolfe in the the late 1960s. It was conceived as a means by which schools and communities could work synergistically together to share land, facilities, and resources in a manner that would be more cost-effective and mutually beneficial to both parties (Wolfe, 1970).

An excellent example of this concept is the Scottish Corners Elementary School in Dublin, Ohio. In planning the facility, school administartors and city officials were able to work together, so that the school could be built on a 13-acre site adjacent to the city park. This allows the students to use the park as a playground, sports field, and a learning tool, and the community has easy access to certain portions of the school after hours (Ficklen, 1988b, pp. 34-35).

In general planners seem to be looking more carefully at building sites to insure that they are environmentally sound and in consonance with the educational program desired. The trend seems to be to work with communities and cities to locate school sites, which are in close proximity to park and recreation areas and are also easily accessible for community and civic functions. As in all planning functions, it is advisable to involve as many stakeholders in the process as possible to insure widespread grassroots support for the school program (Rist, 1988c).

5. Psychological, Behavioral, and Aesthetic Considerations

What can we do in designing facilities that will make them more user-friendly and pscychologically appealing to both students, teachers, and parents? Gaylaird Christopher (1991), a member of the Architects Committee on Architecture, has worked diligently with his professional colleagues for the past year to answer many of these questions. Part of the answer seems to lie in the aesthetic environment of the school building.

Christopher (1991) found in his research that newer facilities did indeed tend to inspire better performance on the part of students and teachers. As he stated, "when children look forward to school, obviously their performance will improve" (p. 10). This did prove to be the case in his studies--students showed as much as a 20% improvement in test scores while in the new facility, as compared with scores in the older facility (p. 10). A pleasant aesthetic environment, in and of itself, simply makes you feel better about yourself.

Bowers and Burkett (1989) also found that students in a more modern building (versus students in an older facility) "scored significantly higher" (p. 29) on achievement tests, had fewer discipline problems, lower absences, and higher self-concepts. Chan (1988) experienced similar results in his research, and he concluded that "better student learning is achieved as a result of an improved aesthetic environment" (p. 26).

Another important consideration in the design of aesthetically and psychologically pleasing surroundings is the trend towards more "user-friendly" environments in school buildings. As Naisbitt (1982) emphasized, we must combine our high-tech environments with high-touch environments. He simply meant that in order to soften the impersonality of the technology that we bring into the schools, we must infuse friendlier spaces, which will make both students and teachers feel more at home and comfortable in their environments.

Christopher (1991) posited that in school facilities, very often this feeling of welcome can be brought about done by the use of bright colors, graphics, and textures, and also by developing spaces for children that are scaled to their size (p. 11). The Donnie Brickman Middle School in Shreveport, Louisiana seems to have accomplished many of these details. Rist (1990) described her visual impressions of this avant garde school: "the bright primary colors sock you right in the eye. Suprising and inviting...[this school] looks like it tumbled out of a child's box of building blocks" (p. 32).

This innovative middle school was designed to offer a place where youngsters could learn, explore, and relate to each other. It was filled with open spaces, clerestory-lighted corridors, and intimate seating areas and alcoves throughout the building for sitting and talking (p. 32). Even the round cafeteria tables encouraged students to sit, relax, and talk to each other. By the intelligent use of colors, shapes, and spaces this middle school made students feel welcome and comfortable (p. 33).

The Whitaker Elementary School in El Paso, Texas was built on an interesting premise. After a great deal of research, the school design team discovered that "children do a great deal of effortless learning on the playground, due largely, it was felt, to the playground's non-threatening environment" (Architectural Citations, 1988, p. 30). The architects and owners felt so strongly about creating a positive, caring environment for the students that they designed a building that became an extension of the playground--with its bold colors, shapes of crayons and rockets, all kinds of geometric and biomorphic forms to crawl through and sit under (p. 30). Another serendipitous advantage to this exciting design is that the building can also serve as a teacher, where students can learn from the shapes and uses of the various building components, which become in effect on-site learning tools (Christopher, 1991, p. 11).

Once again, it is important to emphasize that when students see and experience the feeling that school planners really do care about them, by the creation of aesthetically pleasing school environments, they become involved in the ecological perspective of their campus (Schroeder & Jackson, 1987; Christopher, 1991; Castaldi, 1987; Day, 1985).

6. Designing for Flexibility, Adaptability, and Re-use

How can you design a school facility that delivers the most building for the dollar, fulfills the educational mission, and yet remains flexible and adaptable for future uses? Almost all futuristic architects and planners (e.g., Brubaker, 1991; 1988; Christopher, 1991; Stevenson, 1987) are in complete agreement on the strong necessity for building adaptive, malleable school facilities.

The school planners that built the Scottish Corners Elementary School in Dublin, Ohio were so concerned with the idea of future adaptability of their school facility that they built the school, so that it could be recycled should programs or enrollments drastically change in the future (Ficklen, 1988a, p. 34).

The Prince George's County, Maryland, school district ingeniously solved two pressing problems at one time. The school system had several old buildings that they wanted to recycle, and they also needed a centrally-located science center for district students. Being always forward-thinking, the planners and administrators took an old abandoned building and made it their home for the new Howard B. Owens Science Center, a high-energy, hands-on educational science museum that serves more than 80% of their students each year (Heller & Turner, 1988, p. 26). In this particular case, being inventive and creative really paid off.

Indeed, many schools today are being designed in a more generic manner for the explicit purpose of making them more salable or convertible to office or business space in the event that they are no longer needed by the school system. In seems only proper that schools, like office buildings, should be built in such a manner, where they can have multiple uses in a life cycle and not be disposable units. Recyclable school facilities make good functional and fiscal sense to school districts.

Many school systems, such as Montgomery County, Maryland, are taking advantage of what has become known as "found spaces." This is a term that simply means schools "find" spaces that were not originally designed for schools and use them in some manner, as an educational facility (Office of Education & Educational Facilities Laboratories, 1970, p. 4). School districts in need of extra space for child-care and social services might seek out these "found spaces," as less expensive alternates to building new facilities. The house across the street from a neighborhood school just might offer a viable space alternative for housing a new school program or service, such as an alternate program for high school dropouts.

Brubaker (1988b) reported that perhaps one of the most successful recycled buidings was the multistory factory in Boston that was renovated into the Jamaica Plains High School (p. 66). Perhaps when planners draw up the plans for a new school facility, they should also be required to draw up another set of plans for its secondary use, if and when it is no longer needed for educational purposes.

7. Designing the Right School for Your Community

The trend now seems to be that most, if not all, communities find it difficult to build new school facilities because of severe budget cutbacks and divisive politics. But Kelsey (1989) vividly illustrated that sometimes with the right cost-effective design and a vigorous public relations campaign, a school can be built that will bind a community together and make everyone proud of their educational accomplishments. These types of facilities can be built, if the community and school district can reach a consensus on what the educational program can be.

Kelsey (1989), an architect from Colorado Springs, Colorado, found that his community could not find the school that it wanted because the community was divided over several key issues. Finally, after an intensive design and public relations campaign, a bond was passed for a sorely needed school facility, which the architect promised to deliver on time and on budget. This story has a very good ending because the architect was able to deliver an efficient, cost-effective ($44 per square foot), and aesthetically pleasing facility, which came to be the highlight of the small community. Most impressive was the fact that the Columbine Elementary School won the American Institute of Architects award. This school is now a facility that serves its educational purpose and ties a community together (pp. 18-20).

Community or Open Schools. What are the advantages for a school district and a community in combining services in one location? Research seems to indicate a very distinct trend towards schools that bind themselves closer to communities in order to share facilities and services. These types of schools might be called "habitat schools," which means that they would be the cultural and focal centers of the community (McInerney, 1987, p. 26).

Although there are different variations and definitions of the term "community schools," the Educational Facilities

Laboratories (EFL) (1973) described the community/school "as a place planned and operated cooperatively by schools and other agencies for the delivery of social services, including education to the whole community" (p. 4).

The school/community partnership offers a cooperative, synergistic alliance, whereby schools and communities can work together and share both facilities and services in the interest of convenience and avoidence of duplication of services. Economic constraints and tight budgets have convinced many people that community/schools are a healthy way to go. Most public schools normally operate less than one-third of the day, for about half the year, while serving less than one-fifth of the population (EFL, 1973, p. 4). Schools and communities have recently come to realize that this is not the best investment of the taxpayer's dollars, so both parties have found the increased school/community use plan to be a good way to broaden public support (p. 7).

The community school concept was developed in Flint, Michigan, in the 1930s, when the city decided to combine several facilities and social services together in a cost-saving measure. The Conte Community School, which was built in New Haven, Connecticut, in 1962, broke new ground because it was completely planned, built, and financed by both the school district and the city, as a convenient, frugal means for sharing space and resources (EFL, 1973, p. 7).

More and more schools today, such as the Saturn School of Tomorrow mentioned in Chapter II, have begun to use community resources in their educational curricula by opting to open their school doors to allow students out and the community in for resource sharing. A recent example of a school/community project, which has worked well, is the Scottish Corners Elementary School (mentioned earlier in this chapter) with its school-in-a-park concept. This idea has been so successful that several more facilities based upon this concept are planned in Ohio (Ficklen, 1988b, p. 34).

Brubaker (1991) described the Perry (Ohio) Community Education Village, which is a location consolidation of three separate schools that share facilities, not only with the students of the three adjacent schools but also with the community members. In this particular case, substantial savings are realized in the use of the shared resources of a school mechanical plant, auditorium, fitness center, and kitchen. This innovative "education park" concept seems to be working well for this community, and the trend in this type of design seems to be cost-effective, when communities and school districts can work together cooperatively.

Day-care and social services. Another ancillary trend that seems to be closely related to the community school concept is the phenomenal growth of early morning and after-school day-care for students, including full-time care for children during vacations. The enlivening response, which the extended hours day-care concept has received from parents, teachers, and community members nationwide, presages the success and necessity for this new role that schools have been asked to assume.

Shedlin (1990) incisively stated that because of the dramatic societal changes that have been taking place in our country, children now have additional needs that cannot be met within the home. Because we now have more children "at risk"--latch-key children, shelter kids, boarder babies, and throwaway children--Shedlin (1990) and other concerned individuals have asserted that schools must begin to assume larger, social roles in serving children. According to most experts, schools must begin to serve as the hub of social services, such as medical, mental, health, and other preventive areas because that is the one place that children come every day (p. 14).

Kagan (1989) argued that, up until this point, most of the national efforts at comprehensive early childhood care have been splintered, dysfunctional, and incongruent, when in fact they need to be comprehensive and holistic to be truly effective. The author also avered that educators and concerned citizens are hamstrung by a lack of federal regulations governing early care (p. 435). The concurrent possibilities for warmer community relations and greater parental involvement are also to be found when schools approach the child care problem as a "window of opportunity." Some exciting things are being done in several schools to add social and day-care services to their agendas.

For example, Dade County (Florida) Superintendent Joe Fernandez decided to take the (K-2) schools to those businesses that had already established day-care facilities for their employees, thus in effect creating "satellite learning centers" that are partially funded by the businesses. This innovative idea of having private employers (such as Miami International Airport) provide classroom space saved his school system from further overcrowding. His innovative plan has firmly taken hold, and since 1987, this school/business partnership has saved his county several million dollars (Reecer, 1988, p. 32; Education Writers, 1989, p. 44).

Simpson and Doland (1989) pointed out that employees work better, have fewer absences, and less resignations, when they know that their children are in safe, orderly, protected environments, and that includes teachers (p. 53). The teachers in Rudolph Matas Elementary School in Metairie, Louisiana, took a small cottage next door to their school and converted it into a cozy day-care facility for the children of the teachers. Now, parents and children can visit during lunch breaks, and all parties feel happier and more secure with child-care facilities close at hand (p. 53).

Corporations have led the way in establishing modern, convenient day care for their employees' children because they realized early on that they could save money by keeping their workers satisfied. Currently more than 2,500 corporations provide some type of child-care services for their employees because the child care also acts as a valuable recruitment and retention tool (Ancell & Haugen, 1986, p. 36). The Ukiah (California) School District found that their extended day-care services were able to bolster valuable community support and counter problems of declining enrollments and limited growth by showing their caring attitude towards early child care (DiGeronimo & Gustafson, 1986, p. 30).

Most researchers have concluded that schools in the future must improvise and uniquely tailor their own personal program of early child care and social services that will most appropriate for their own individual community. Zigler and Ennis (1988) offered these suggestions for schools in the 21st century:

> It is a neighborhood school that also serves local child care needs by providing:
>
> 1. High quality before- and after-school care for school-aged children;
>
> 2. High quality day care for three and four year old

pre-school children;

3. An education program and family support system for parents of children from birth to the age of three;

4. A networking system for home-based day-care providers;

5. An information and referral system for parents in need of day-care; and

6. A strong parent-school partnership in all activities. (p. 12)

Based upon the strength of these arguments, planners of future school facilities should carefully consider how their designs can more closely approximate the child-care needs and social services that are forecast to be necessary in the future.

Business/Industry partnerships. As schools work with their communities to share resources, they must also be cognizant of the tremendous opportunities for advancement and help, when they work synergistically with businesses and industries within the community also. Piccigallo (1989) reported that "60,000 business-sponsored enterprises are currently operating in American schools" (p. 405)

An exemplary case of a school/industry relationship took place in Scott County, Kentucky, when Toyota decided to build a $1.2 billion plant in their area. John Herlihy, Superintendent of Scott County schools, community members, and officials from Toyota decided to roll up their sleeves and work together to plan and improve the educational opportunities for schoolchildren who would graduate from high school in the 21st century. The result of their efforts was a blue ribbon planning team that envisioned, planned, and funded high-tech, "smart classrooms" for the future in their schools. Over a 20-year-period, Toyota will invest $8 million in Scott County educational endeavors, which goes to show that school and industry partnerships can be as smart as the technology they help to fund and create (Herlihy & Day, 1989, pp. 39-40).

8. Technology in the Schools

Almost everyone is in agreement that the trend toward world-wide, higher technology will affect public schools of the future, but the unanswered question is how much and in what ways? Most experts are also in agreement that technology is a valuable tool, and not a babysitter or replacement for the teacher in the classroom. McElrath (1968) cogently recognized that, in its early stages of development, instructional television "should not be installed for the purpose of saving teachers and classrooms" and that in utilizing such technology "students must be taught to become responsible for their own learning and discovery" (p. 64).

Many experts are also concerned that even with the availability of high-tech equipment, schools will be slow to change gears and will continue to utilize 21st century technology in an 19th century manner. Weinstein and Roschwalb (1990) argued that "our schools are still based on the evolution of America's economy from agricultural to industrial" (p. 115). The authors recounted a New York Times report, which sadly commented that "'the computer is becoming almost as common as the blackboard in the nation's classrooms, but most schools have yet to use it more inventively than they use the blackboard'" (p. 116). Weinstein and Roschwalb chillingly concluded by stating that "two-thirds of teachers in the U.S. now use computers--and a majority of them feel less computer literate than their students" (p. 116).

Levinson (1990) also saw the possibility that technology may not increase the effectiveness of education or the process of learning. He also seemed strongly inclined to believe that resistance to change in the schools can be overcome and technology implemented, which can radically transform these schools.

It is imperative to remember that regardless of the level of technology chosen for a school facility, the overall direction that the technology takes must be in consonance with the goals of the district and state school system. Bowyer (1990) recognized, that in his own Virginia

Beach (Virginia) school system, piecemeal approaches to purchasing technology are not effective. This system found that lots of forward-looking, thinking, and planning were necessary, before the whole system and the state "bought into" the technology paradigm. Bowyer (1990) also suggested that a carefully directed technology plan be headed up by a panel of experts who could direct and steer the school in the right directions (p. A13).

Most schools, which want to participate in bringing their schools on-line with the 21st century, usually concentrate on several key areas first: (a) data and information processing, (b) communication, and (c) video and instructional media distribution. These are just broad, loosely-coupled categories, which cross and overlap each other.

Different schools approach the problem of how to break into the technological future and bring it into their schools in many diverse ways. Many planners and administrators sense that, if properly planned and used, technology is an imperative for schools to remain effective, competitive, functional institutions into the 21st century.

Meckleberger (1989) envisioned technology, as the glue which would enable the school restructuring agenda to succeed (p. A6). Al Shanker (1990), President of the American Federation of Teachers, concurred with Mecklenberger and also stated that with technology educators could finally approach individualized instruction in a realistic manner by "the radical transformation and customization of education" (p. A4). Technology offers schools and teachers new paths to follow away from the old didactic system of lecturing and listening into exciting areas of individually-paced and variegated learning. Shanker (1990) even went so far as to predict that, without the synergistic use of appropriate technology, American public education cannot survive (p. A4). Piccigallo (1989) astutely noted an observation from the authors of A Nation at Risk: "'Excellence costs. But in the long run mediocrity costs more'" (p. 405).

The Educational Technology Specialists at Mission Viejo (California) schools realized that you cannot thrust technology unwittingly on teachers and expect them to become overnight experts without some formal training and acclimatization. They set up special paid training sessions for their teachers during the summer and five days release time during the school year to ensure that the teachers felt more competent and confident with the technology that they would be using in their jobs (Electronic School, 1990, p. A16).

Many school districts are justifiably daunted by the monetary impact of expensive educational technology. Faced with rising per-pupil expenditures, school boards are often reluctant to "buy into" high-tech programs, which they can barely understand and hardly afford. Tapping into the 21st century is an expensive proposition, but there seem to be few viable alternatives to capture the imaginations of children who have been weaned on video and TV multimedia for thousands of hours, even before they walk into their first year of school. Technology may not provide all the answers, but it just might be the source to direct our school programs to an audience that will probably never properly respond to the didactic pedagogical methods that were used on many of the teachers themselves (Dede, 1989).

Since all school systems approach the problem of how to apply the appropriate technology from different angles, it could prove beneficial to examine the multi-faceted directions that some districts take to making their school systems more high-tech for the future:

(1) Most schools in the United States have already taken their first technological step by purchasing a videocassette recorder (VCR). More than 90% of the nation's public schools now have a VCR. Some schools have found that electronic equipment has now become so cost-effective and easy to operate that they can afford television production studios in their individual schools. To children, with an audiovisual orientation, typical classroom lectures can be more dramatic and effective, if supplemented with visual materials. The fifth and sixth graders at Burtsfield School in West Lafayette, Indiana, videotape their own news,

weather, and sports programs that are rebroadcast to the entire school later in the day (Electronic School, 1989, pp. A8-A9).

(2) The sudden impact of educational television (ETV) upon the schools has taken everyone by surprise. Just within the last several years, the proliferation of choices of ETV has added even more resources to many school districts, such as: (a) Whittle Communications, (b) the Public Broadcasting System (PBS), (c) the Children's Television Workshop (CTW), (d) the Cable News Network (CNN), (e) the Discovery Channel, (f) the Learning Channel, (g) C-SPAN, and (h) Arts and Entertainment (A&E). These programs have brought world and national news, current affairs and history specials, documentaries and science specials directly into the classrooms, thus adding more curriculum tools and responsibilities to the teachers (Electronic School, 1990, A6-A9).

(3) Many schools now have their curriculum programs, including encyclopedias, on videodiscs and interactive video programs such as the 75-hour "Video Encyclopedia of the 20th Century" (Electronic School, 1989, p. A9).

(4) Long Distance Learning is being used in many schools, especially in geographically remote areas, to electronically bring master teachers and high level subject areas to both students and teachers. The federally funded Star Schools Projects has joined up with the Technical

Education Research Centers, Inc. (TERC) to link more than 450 schools nationwide with scientists, students, and teachers who will work cooperatively together and share their information via telecommunications. Because of the quantum leaps in video and communications technology, many states are installing satellite dishes at individual schools. These downlinks will enable the schools to be linked electronically to other educational institutions and programs, both nationally and internationally (Electronic School, 1989, p. A11).

Weinstein and Roschwalb (1990) reported that state governors are especially interested in the outstanding possibilities that satellite learning and telecommunications technology can bring to not only students but curricula, teacher training, and school administration. Kentucky, Oklahoma, and Texas are investing heavily in long distance learning and telecommunications technology, as a means of dealing more equitably with educational resources in their rural school districts (p. 117).

(5) The Montgomery County (Maryland) School District began using computer technology a decade ago. Today, they are part of a "technologically attuned community" that now sets the benchmark for use of technology in their schools, such as their remarkable weather satellite ground station at Gaithersburg High School. This innovative system, which costs between $2,500 and $7,000, allows students to develop

hands-on, real-world, technological expertise by performing jobs that may ultimately open career opportunities for them later on (Electronic School, 1989, p. A19).

(6) The Lorain (Ohio) School District decided to spark students' interest in technology by building a simulated mockup of a space station in their Southview High School. The space station, complete with computer hookups and video monitors, actually takes students through a realistic three-day space mission simulation. The mission was also integrated throughout the curriculum with other students participating in the myriad facets of the mission.
Once again, technology can be a valuable tool for making students employ real-life skills that they have learned in school (Electronic School, 1990, p. A21).

(7) Modern electronic technology can also be a boon to school officials and teachers by allowing them laser-quick access to records, tests, data, and schedules. By aiding teachers and assisting them to pull up information at any time from their individual classroom computers, technology empowers them with a greater sense of professionalism (Electronic School, 1990, p. A23).

(8) Electronic voice mail, building security, clock/bell systems, and individual electronic panels (digital clock, telephone, computer modem and network jacks, and power switches) in each classroom are a few of the technological amenities that the Eagan (Minnesota) School

System installed when they planned their $41 million venture into 21st century schools. Tom Wilson, principal of the school and part of the planning team, sagely suggested that "'it's much cheaper to put the technology in when you construct the building than to add on later'" (Electronic School, 1990, p. A20).

(9) Students in a Norfolk, Virginia, high school have been given an excellent opportunity to learn about robotics thanks to some creative technology and community partnerships with NASA scientists, computer programers, and other helpful university personnel. By working with videodiscs and realistic robot models, students can experience firsthand the discovery and learning that comes about when technology and teaching are linked to realistic job experiences (Electronic School, 1990, p. A32).

In each of these cases, schools have either constructed or adapted their facilities to fit their own tailor-made program of technology, which best serves their individualized instructional purposes. No one system works best for everyone, simply because of the uniqueness of the community environment and budgetary constraints. Ultimately, each system must decide upon how much technology they wish to invest in and in what direction they want to venture.

9. The Design of the Facility: Interior/Exterior Spaces

Almost everything that has been discussed in this chapter previously, has led up to answering this one question: After all the planning and educational specifications, what kinds of spaces should be designed in the school facilities themselves to make them function properly for students, teachers, and curricula? It must be remembered that both the students and the curricula in the next 20 years will be the most diverse ever (Alley, 1989; Coleman, 1989; Earthman, 1987; Hathaway & Fiedler, 1987). How can planners and practitioners really know, if the spaces that they design and allocate will fulfill the educational program of the school district?

The types of interior and exterior spaces that are designed must carry out a plethora of equally diverse needs and still consumate the educational mission of the school (Castaldi, 1987). These special spaces must be designed with an unwavering focus towards creating the types of comfortable, enriched, relaxed environments in which students and faculty will be eager to learn and work together.

This ecological or environmental design concept can be effected in some rather simple ways that can bring about high powered results. For example, the planners of the Snowqualmie Valley (Washington) School District wanted to make their middle school students feel like the school was really their home, so they deinstitutionalized the traditional school locker concept and allowed students to have personal closets with a slot on the front of each one for the students' name and an area for special recognitions and awards. This special attention to the student's personal transition areas such as lockers and halls seems to be another way schools can create softer, familial-style environments for students (Ritterspacher & Hill, 1990, p. 21).

The Lyles (Texas) Middle School wanted to do something special for their students, so they created a friendly mall-like atmosphere for their students to meet with friends and socialize. These planners realized that young people need quiet times and personalized spaces for conversation and development. Schools are justifiably learning that, just as in their own home environment, students need spaces that they can identify with and feel that they belong exclusively to them.

Urban schools also face the need to soften and personalize their school environments, especially in the backdrop of crowded buildings and large populations. Public School 114 in Brooklyn, New York, found an inventive way to energize their students and make them feel like they have special educational spaces. In this particular case, the school created its own "big green schoolhouse," an 18' x 42' greenhouse housed in the basement of the facility, where students not only enriched their science skills but learned valuable lessons about the patterns of life and the earth. Many of these children were apartment dwellers who had never had the opportunity to watch things grow; in the big greenhouse, they learned to make things grow and also experienced a growth in themselves, as they gained a respect for living things. In this elementary school, an inexpensive idea has turned disused space into a warm, welcoming environment in which children can personally identify with and be justifiably proud of (Stetson, 1990/1991, pp. 34-35).

Most educational planners will agree that the school facility must be aesthetically pleasing, energy-efficient, cost-effective, and totally functional, but they often forget perhaps the most important design concept--flexibility. In general, the benchmark for any facility must be its ability to be pliant and malleable. In order to weather the myriad changes that are going to take place in the future, interior spaces must be designed, so that they can house programs that may not even be envisioned yet--the space that today must accommodate one program, may be forced in several years to accommodate another program that is very divergent. Student populations will change, as will federal mandates for special classes and educational programs, therefore the facilities must be compliant and tractable.

Castaldi (1987) differentiated in the need for both adaptability and flexibility within school facility spaces:

> Flexibility is conceived as a feature of a school building that facilitates extensive changes in the sizes and shapes of teaching areas without endangering the structural system of the building. Adaptability makes it possible to accommodate new functions in given spaces, while flexibility makes it possible to redesign old spaces to satisfy new needs. (p. 172)

Keeping this definition in mind, the author sagely countenanced that the prime requisite in a flexible facility is fluidity, which can be best maintained if "all [the] walls of a school building, with the exception perhaps of the outside envelope, should be conceived as temporary space dividers" (pp. 172-173).

One of the prime considerations of all interior spaces must be a feeling of belongingness and security that are of paramount importance to the learning process (Castaldi, 1987). Students and teachers need a warm, welcoming environment in which to work, learn, and experience new ideas each day. Day (1985) has astutely observed that "A school constitutes the first experience that most children have of the greater world outside their homes" (p. 13), therefore everything in the design process should be centered upon making this a positive, enriching experience. Brubaker (1990) affirmed this concept, when he stated that "The quality of a building is a message to all the user's of the spaces, telling them that the school is, or is not, an important place in the community" (p. 14).

Naisbitt (1982) asserted that schools must be both high-tech and high-touch environments. The more technology that we bring into our lives and school buildings, the more it becomes necessary to aesthetically "soften" that environment with more warm, comfortable human touches. Brubaker (1990) stated very strongly, along with Naisbitt, that as one welcomes technology into to the learning environment, the art of architecture must concurrently

> create a more humane, more varied, more beautiful learning environment. . . .A caring environment [with] a great variety of spaces, providing students with diverse spaces and equipment, including places for reading, writing, and conversation . . . learning spaces will first be people places. (p. 15)

Keller (1986) suggested that such "environment enhancement"--the systematic and careful coordinating of all interior materials, colors, and textures in conjunction with the furniture, equipment, and occupants--should be the job of a trained educational interior designer. She also correctly averred that these design specifications must be clearly stated in the educational specifications (p. 20).

Rydeen (1989) cogently illustrated that not only are our spaces becoming more sophisticated, but the size of the spaces has increased dramatically in the last 20 years. He stated that in 1969 the average elementary school allotted 60 square feet per student, while in 1989 the same type school allocated approximately 124 square feet per student (p. A15).

The reason for the tremendous increase can be explained by: (a) the expanded curricula offerings and specialized programs; (b) the switch from less multi-purpose classrooms to more spacious special-purpose rooms (art, science, band, special education); and (c) more spacious and sophisticated gymnasium facilities, pre-school, in-school, and after-school care facilities (p. A15). Rydeen (1989) also asserted that the size of school sites have also grown in proportion to the programs offered at the school. Most schools have recently offered more diverse sports such as soccer and tennis with their more cosmopolitan playing fields, due he believed "to better educated, more sophisticated parents . . . asking for higher quality buildings with more pleasing public and community areas" (p. A15).

School interiors must encompass a plethora of multi-faceted spaces such as: (a) flexible cubicles (wired with audio and visual technology) for computer and collaborative study groups; (b) technologically sophisticated music and drama rooms (that will be used across the curriculum with other disciplines); (c) large, open art rooms that may house an atrium with skylights and clerestories for natural light; (d) multi-purpose gymnasia, which will be designed to be shared and used by the community; (e) kitchens that are ultramodern and engineered to be satellite facilities for fixing meals for adjacent schools and also convertible for civic and community use by Boy Scouts and other groups in evenings and weekends; (f) quiet interior alcoves and conversation spaces around the building for student socializing; (g) "great spaces" within the school where large, communal groups of students can socialize and meet; and (f) the heart and foundation stone of many facilities, the Instructional Media Center (IMC) that will be designed to be the pivotal focal point for the learning and electronic communication.

In all these scenarios, the old traditional division of school buildings into discrete classrooms is no longer applicable to school planning for the future. Just as autocratic, didactic teaching modes are being replaced by humanistic, collaborative instructional techniques, the isolated classrooms (with concomitant isolated teachers) will be have to be replaced. These new spaces will be open, user-friendly behavioral settings with project and seminar rooms, multi-purpose rooms that are designed for flexible usage, and quiet spaces for play, conversation, and socialization.

Students and teachers can no longer afford to be locked into only one room for instructional purposes--learning will become more fluid and diverse in manner and location. Technology will allow more individualized instruction at electronic workstations that are tied into central control banks in the classrooms and Instructional Media Center (Miller, 1991). These are what Dede (1989) called "empowering environments" (p. 23) for students to learn. He emphasizeed that "students in conventional classroom settings have few opportunities to build skills of cooperation, compromise, and group decision making . . . computer-supported learning [must become] a major type of student interaction" (p. 25).

Quest (1989) underscored the above and iterated that flexibility, movability, and open-ended capability to add on new technology as needed are the key linchpins to a successful Instructional Technology Center in the school facility. He also correctly noted that when one deals with high-tech equipment, concurrent security measures must be installed, and ergonomically designed rooms must be used with demountable walls, movable light fixtures, and flexible, wired workstations (pp. 25-27). Day and Herlihy (1989) also asserted that in planning, it is critical to remember that regardless of the type of spaces and programs anticipated, "new technology requires more space than we have previously allocated" (p. 20).

All these congruous changes must be reflected in the architecture and design of facilities' spaces. In designing these loosely-coupled, yet tightly-woven spaces, Brubaker (1988a) asserted that many of these designs will be predicated on entirely new uses for the spaces when demographics or needs change.

These sophisticated, multi-purpose spaces will also require more energy-efficient HVAC (heating, ventilating, air conditioning) systems. Increased use of computers and sensitive electronic equipment will especially necessitate: (a) "clean power" with adequate surge protection; (b) battery-operated uninterrupted power sources (UPS); (c) higher levels of sound, dust, and climate control; and (d) energy-efficient lighting (Gianakopoulos, 1989).

Listed below are several more types of both specialized and generic spaces, which will be necessitated in planning schools of the future:

(1) More individualized meeting spaces for teachers, parents, and students to conference. These spaces must be relaxed and comfortable with a home-like ambiance whenever possible. For example, instead of an institutional chair in her office, one principal provided her guests with a rocking chair.

(2) Tailor-made spaces for resources (the Information Age will require greater ease and accessability to larger amounts of resource materials).

(3) Multi-purpose laboratories to be used holistically in a variety of subjects.

(4) A variety of computer and instructional workstations, linked to a central media center for individualized instruction via computer, ETV, or satellite learning centers.

(5) Generic spaces sufficient in size to accomodate student television stations, weather stations, real-life work simulations (i.e., stock exchanges, banks, restaurants, stores, courts), or space simulations.

(6) Facilities for early child care, pre- and after-school day care, and in-school care of infants.

(7) Some flexible classrooms designed for needs of adult learners (this means also not placing desks that are too small or uncomfortable for adults in these spaces).

(8) Life technologies classrooms, which may be located outside the interior school facility in a smaller self-contained building for privacy and community use.

(9) Broad-based vocational spaces for the switch from Industrial Arts to Industrial Technology.

(10) Spaces for the use of multi-media presentations to both students and community groups (Babineau, 1991 pp. 6-9).

These are only a few of the different types of interior spaces, which will be necessary in the innovative schools of the future. Each school must look carefully at its individual educational specifications and tailor a design that works for them, while keeping the cardinal rules of flexibility and adaptability in mind.

10. Energy-Efficiency and Environmental Concerns.

Today's educational architects and planners are becoming extremely cognizant of the need to be more environmentally aware and energy-efficient in the school facilities that they hope to build. Planners can no longer afford to build facilities, which are not cost-effective, environmentally safe, and energy-efficient. The lessons learned in the energy crunch of the 1970s and the monumental expenses of asbestos abatement in the 1980s have taught practitioners to look more carefully at designs, materials, and life cycle costs. Vasilakis (1990) also cautioned that radon identification and mitigation are new additional and vital environmental concerns for the 1990s that must be addressed, as schools are planned for the 21st century.

Most architects are in concert that school buildings should "fit" into the environment, naturally and comfortably. Christopher (1991) noted that schools "should emulate the environment, growing from it, adopting the best attributes while improving the worst" (p. 11). Interestingly, most energy-efficient schools do fit more naturally into the environment, simply because they are more closely attuned to the building site, contiguous surroundings, and the orientation towards the natural elements.

The following two schools have had wonderful successes in achieving both an aesthetically pleasing environment and an energy-efficient facility:

Quince Orchard High School. At Quince Orchard High School in Gaithersburg, Maryland, architects designed features that made the school functional and efficient. The facility was sited and oriented to achieve the maximum heat buildup in the winter months, and the minimum in the hotter summer months. The light, airy feeling inherent in the interior design of the school was achieved by the abundance of indirect, natural daylight diffused throughout the building.

Windows and skylights were evidenced in southern exposures and were positioned, so that some of the sun's rays were captured throughout the year. Most of the classrooms received generous amounts of direct and diffused natural light through "light shelves," which appeared to be deep, slanted windowsills. These light shelves ingeniously bounce the light into the classrooms and off the ceilings. Great savings were realized in artificial lighting alone. There was a minimum of glass exposed on the northern exposure, which became another energy savings. Both heating and air conditioning were minimized because of the optimal site orientation, earth sheltered or bermed northern walls, and high-tech HVAC systems, which electronically ducted out hot air and maintained strict temperature controls (Rist, 1988a, p. 32).

Meadow Park Elementary. The energy-efficient, passive solar design of the Meadow Park Elementary School in Irvine, California, was completed during the aftermath of the Arab oil embargo of the 1970s and then shelved when enrollments declined. Approximately 10 years later when enrollments increased, the design was resurrected and built almost without a change. This fact is a testament to the durability and practicality inherent in designs that are trend-oriented, and not fleeting impractical fads.

The school's design attempted to focus on controlling the two main sources of energy consumption in California schools--namely lighting and cooling. Approximately 91% of the energy consumed in California schools (at this time) was a result of these two efforts (36% for lighting and 55% for cooling). By judiciously placing fewer windows in the sunny orientations and by the use of specially placed clerestory windows, an abundance of natural light and a minimum of heat buildup was achieved. Cooling savings were realized by: (a) strict site orientation, (b) screening by trees, (c) earth berming, (d) high levels of insulation, and (e) a high quality, electronically sophisticated hot/cold air removal/retrieval HVAC system.

The success of the Meadow Park design was in its underpinnings of basic energy-efficient building practices and simple design, coupled with the best that technology had to offer (Rist, 1988b, p. 44). These elements are time-tested and proved in unique, cost-effective, aesthetic structures such as this facility.

Even with the most high-tech materials and ideas, there can be some dangerous side effects, which planners must be aware of. Reecer (1988b) pointed out that practitioners must remain knowledgeably informed and constantly aware of the hidden environmental dangers to be found in new facilities. The author reported that sometimes the "sick building syndrome" can have disastrous cosequences brought on by the mixture of chemicals found in building materials and/or improperly installed or adjusted HVAC units (p. 17). These symptoms can be avoided by close cooperation and planning with architects and generous amounts of maintenance and operational information to teachers and administrators (p. 17).

11. Sonic, Thermal, and Luminous Environments

As educators and planners attempt to plan, design, and build school facilities to fulfill the educational functions of the 21st century, it is important to realize that they cannot change the educational programs without concomittant changes in the ancillary systems of the facility, such as climate control, acoustics, and lighting. The use of sophisticated, high-tech computer, electronic, and communication equipment brings with it the concurrent necessity for equally well-designed innovative HVAC systems, state-of-the-art lighting systems, and efficient acoustics.

Day and Herlihy (1989) have indicated that computer rooms require entirely different power and lighting needs than other school rooms. Very often they must be windowless with: (a) special low-brightness (parabolic) lighting modulated with dimmer controls; (b) sensitive temperature and humidity controls; (c) a dependable, surge-protected UPS system; and (d) a high-grade physical security system for their safety (pp. 20-23).

Optimum temperature and humidity are also equally necessary for students and teachers to function at their peak levels. Once again, Day and Herlihy (1989) asserted that the most satisfactory temperature for classroom learning "is 70 to 74 degrees Fahrenheit with a relative humidity of 40 to 60 percent" (p. 21). Systems are now in place that can accurately maintain acceptable levels of heating, cooling, humidity, and dust control in school facilities.

Companies like Honeywell have designed "smart energy control systems" for HVAC, which can be electronically monitored from both the principal's office or home. Many of these same companies offer systems so sophisticated that they guarantee the annual amount of the energy savings (Ohio High School, 1989, p. 85). The trend in the future seems to be for school districts to employ energy professionals (like Honeywell) to design and guarantee "smart systems" that can deliver the HVAC services at the best possible savings to the school district.

In talking with teachers about design concepts for their school facilities, Brubaker (1991) found an almost unanimous request for classrooms with plenty of windows. Architects, students, and teachers have become more cognizant of the need for the judicious use of natural lighting whenever possible. Visible trends in school architecture illustrate the increased use of skylights, clerestories, atriums, and indirect lighting in an effort to bring in more of the outside world and place the school in a more compatible arrangement with the environment.

Frohreich (1986) stated that "perhaps the most violated environmental conditions in classrooms is poor lighting," (p. 10) followed closely by inexact acoustical or sonic environments (p. 10). Lighting manufacturers have recently begun to design flexible lighting to work in tandem with the myriad lighting needs of high-tech schools. Interestingly, the author illustrated the importance of a highly-efficient acoustical treatment in the classroom. According to Frohreich (1986), "A person needs to hear about 97 percent of the words [word intelligibility] correctly, in one's own language, to comprehend what is being said without undue fatigue" (p. 12). Thus intelligent use of acoustical materials would seem to be a paramount concern to facliity planners.

All of these sonic, luminous, and thermal conditions must exist and operate at optimal levels, before learning can take place effectively. Even more importantly, as Graves (1989) emphasized, with more "interactive" learning (an educational process that encourages students to participate and move around, rather than idly sit and listen) taking place in schools, climate control and other systems must be state-of-the-art for the other functions of the facility to be truly effective (p. 19).

12. Expanding Interior Spaces--Portable Classrooms.

The ubiquitous portable classroom--they are a bane for architects who espouse high quality, planned, stationary facilities, and they are a boon for the harried administrator who must find an immediate classroom setting for unexpected burgeoning enrollments of students. Wolves at the Schoolhouse Door presciently noted that "portables are becoming less of an emergencey solution and a more permanent fixture on American schoolyards" (p. 39). In fact, the Education Writers stated that California has mandated that "state-aided building programs . . . must include at least 30% of the instructional space as portable facilities" (p. 39). Portable or modular classrooms have become the only viable, practical, and flexible solution, both short and long term, for many financially strapped school districts who are short on funds and long on pupils. Spurred on originally in the 1950s and 1960s by the baby boom enrollments, modular classrooms were federally reimbursed through the National Defense Education Act (p. 41).

Many school districts have had great success with the expandable or contractable buildings, which have a permanent core area of administrative offices, cafeteria, and library, coupled together with the ancillary portable or modular classrooms. In the event that enrollments decline, the modulars can be moved to another site, and the core facilities turned community and activity centers (Hoang, 1984, p. 23).

Different school districts have become very inventive using different forms of these strategies. Dade County, Florida decided to build their own portables, which would look as nice (and last as long) as any permanent structure when built on to the non-moveable core facility. Additionally, these units could be constructed at about two-thirds the cost of a site-constructed facility (Stover, 1987, p. 42). Approximately 25% of Maryland's new school facilities will be modular or portable units that are especially designed with higher quality standards to blend in more easily with the core buildings (Reecer, 1988a, p. 34).

The Flint (Michigan) Community School district attacked the problem of more space in another novel manner. During urgent times of boom enrollments, school officials decided to build small, house-like classroom buildings in the neighborhoods with the greatest enrollment needs. These permanent, self-contained facilities (primary units) were approximately 1,300 square feet and designed in clusters for kindergarten through third grade. Each primary unit was attached to a home school where the children ate, took physical education, and used the library. When enrollments declined, school officials sold the units as future houses (Reecer, 1988a, p. 34).

Regardless of their use, portable or modular classrooms represent a trend in American educational circles. It seems certain that these types of peripatetic classrooms are destined to play an integral part in school facility planning for the future. Portables serve a unique function when designed in various, innovative shapes and forms tailor-made to fit specific situations.

Summary

All of the previous suggestions and ideas that have been discussed in the second section of this chapter have had one common core--they all attempted to explore new paradigms for change in educational facilities. The school buildings that are planned for the future will have to fulfill a tremendous number of expanded responsibilities (many of which have yet to even be envisioned). Our public school facilities must meet all of these implacable changes and challenges in a resolute manner.

The space environments that are created for students must be more than just places to learn, but rather they must be spaces that encourage and enrich all facets of the students' lives and learning experiences. In the broadest sense, the school facility must extend and expand the horizon of the student and personalize it whenever possible. Planners, educators, and practitioners must seek to envisage and create those "empowering environments [that] enhance human accomplishment" (Dede, 1989, p. 23).

This list of trend approaches is not meant to be definitive, exhaustive, or all-conclusive in scope; it is merely designed to enlighten the reader in some specific areas of trend-related school planning that might merit further consideration and study.

The second section of this chapter has been a presentation of some of the more innovative trends that because of their practicality and timliness seem destined to impact upon planning educational facilities in the future.

Chapter 3

Procedures and Methodology

Introduction

This chapter encompassed a description of the study, including the procedures and methods followed. Additionally, the selection of the jury of facility planning experts was be elaborated upon, as well the criteria and description of the rating sheet used to validate the guidelines, along with the research questions and summary.

Description of the Study

This was a descriptive qualitative study using the content analysis approach to analyze global, societal, and educational trends in an effort to formulate guidelines that would be of benefit to school officials and laypersons in the planning of future public school facilities.

Gay (1987) has observed that one of the purposes of historical research is to systematically collect, objectively evaluate, analyze, and synthesize past data in order to identify trends or patterns that will clarify future events. Glassner and Crozine (1982) have also suggested that content analysis is especially applicable to these types of endeavors and well suited to these types of library research investigation.

After a thorough review of the literature, numerous on-site visits to innovative futuristic schools, and interviews with educational facility planning experts (see Appendix A), proposed guideline elements for planning future public school facilities were formulated. By means of the questionnaire method, these proposed guidelines elements were submitted to a self-selected jury of facilities experts to insure the validity and reliability of the elements. Those elements considered relevant to planning future school facilities were used to develop the final set of guidelines that could act as an informational baseline for educators and practitioners to consider in their school planning efforts.

Procedures Used in the Study

The East Tennessee State University computer services was used to perform ERIC searches on all facets of educational futures, planning trends, innovative public schools, and the historical development of public school facilities. The on-line computer services of the Interlibrary Loan department of East Tennessee State University were also used to conduct an ERIC search of doctoral dissertation abstracts in the appropriate fields of educational facilities, planning, and future trends. Moreover, a manual search of the doctoral dissertation abstracts from 1982 to present was made in an attempt to uncover any supplementary information in the abstracts, which might be contained in titles and descriptors not included in previous ERIC searches.

The review of the literature included all pertinent governmental documents, studies from educational agencies, and Department of Education reports. Special emphasis was given to journals such as The Futurist, The American School Board Journal, and The Educational Facility Planner. The Interlibrary Loan services was called upon to provide both books and dissertations from other universities not available at East Tennessee State University. The proposed guideline elements that were developed from the review of the literature, on-site visits, and interviews with school administrators, architects, and planners were submitted to an arbitrary jury to secure their validation and ratings. The final set of guidelines were written after receiving the evaluations and suggestions of the jury of specialists.

Selection of the Jury

Based upon names derived from a review of the literature, on-site interviews, correspondence with authors of journal articles, and interviews conducted at the Fall 1991 meeting of the Council of Educational Facility Planners International, an arbitrary jury of experts was asked to participate in critiquing, validating, and offering additions to a list of proposed guideline elements for future public school planning. In every possible case, the researcher tried to talk to the individual specialists whenever possible to explain the purpose of the study and to ask for their help in validating the study. The list of potential jury members was compiled, and then the rating sheet with codes and proposed guidelines in questionnaire form was sent to them along with a letter of explanation.

Description of the Rating Sheet

A thorough review of the literature sources, completion of comprehensive on-site visits to selected futuristic schools, and extensive interviews with architects, administrators, facility planners, and school personnel was first accomplished. Next, the proposed guidelines in questionnaire format were presented to a jury of public school facility experts to secure their evaluation and to determine the validity of the guidelines, thus strengthening the study.

The rating sheet with guideline elements was pretested by three other experts in the field of educational facility planning, who were not on the final jury of experts. Based upon the results of the pilot study, the revised rating sheet was then sent to the arbitrary, preselected jury of facility specialists, along with a cover letter of explanation. The jury was then asked to rate each proposed guideline, give any constructive criticism, and add any additional guideline elements that they felt might be important.

Each of the proposed guideline elements was independently rated by members of the jury according to the five-item Likert scale:

	Code	
5	Essential	An element that would be necessary in planning future school facilities
4	Highly Desirable	An element that is not absolutely necessary but would be of functional value in planning future school facilities
3	Significant	An element not necessary but would have some functional value in planning future school facilities
2	Little Significance	An element holding little value even though its presence would not harm the planning process
1	Not Applicable	An element which would have no value in the planning process

The facilities rating sheet consisted of two parts:

1. Elements for Planning Future Public School Facilities

This section of the rating sheet contained the proposed guideline elements obtained through the review of the literature, interviews, and on-site visits. The jury member was asked to circle only one number on the rating sheet for each element. If the respondent felt that the element is essential, s/he circled arabic numeral 5; if it is highly desirable, 4; is significant, 3; is of little significance, 2; and a 1 indicated that the element is not applicable.

2. Suggestions

The second section of the rating sheet consisted of open-ended items to allow the jury of specialists the opportunity to recommend any additional elements that may not have been identified on the sheet. This section was especially valuable to the researcher because it was here that the combined expertise of the jury members could be utilized. At this point, they were able to scrutinize the guidelines and note other additional areas that were not suggested in the proposed elements.

Collection and Treatment of the Data

The respondents gave their ratings to the elements of planning future school facilities that they found essential, highly desirable, significant, of little significance, and not applicable. The were also given the opportunity to add any additional elements that they felt were necessary but not covered in the questionnaire. Those guidelines that received a mean value of 4.5 or better were considered essential. Guidelines that received a mean value of at least 3.5 but less than 4.5 were considered highly desirable. Any guidelines that received a mean of 3.0 but less than 3.5 were considered significant. Those guideline elements that received a mean value less than 3.0 were considered by the investigator to be of little significance or not applicable and not included as guidelines. The additional elements suggested by the respondents were compiled and discussed in Chapter 5.

Research Questions

The data analyses were reported around the general research questions.

Research Question 1. What are the most pressing needs for educational facilities in the future? This question was answered through a review of the literature that was presented in Chapter 2.

Research Question 2. As educators, administrators, and concerned citizens, what are the goals we should seek in designing and implementing future school facilities? This question was answered through a review of the literature, on-site visits, and interviews with architects, planners, and school administrators, and was presented in Chapter 2.

Research Question 3. What trends can be identified that will enable educational practitioners to plan more carefully the kinds of facilities that they construct? This question was answered through a review of the literature, on-site visits, and interviews. These data were presented in Chapter 2.

Research Question 4. What kind of guidelines can be formulated for planning future school facilities? This question was answered through a review of the literature and verified by the jury of expert's ratings of the guideline elements which were presented in Chapter 5.

Summary

This chapter presented the description of the study, including the procedures for identifying the guideline elements in the literature review. The chapter also discussed the selection procedures for the panel of experts, and the description and administration of the guideline rating sheet. It concluded with the treatment of the data, the research questions, and the summary.

CHAPTER 4

Guideline Development

Introduction

The purpose of this chapter was to present the selection of proposed guideline elements for planning future public school facilities that were developed from a thorough review of the literature; identification of significant global, societal, and educational trends; interviews with educational facility planners; and on-site visits to innovative public schools. It was not intended for this chapter to include every minute detail necessary for the effective planning of school facilities, but rather these guidelines presented covered certain basic areas, which must be carefully considered in the planning process. The five broad sections considered essential, for which guidelines were established, were: (a) Planning, Design, and Site Selection; (b) Environmental Enhancement Factors; (c) Space Utilization; (d) Technology; and (e) School and Community Service Areas.

Planning, Design, and Site Selection

One of the most crucial, yet often neglected areas of school facilities involves the complex and time-consuming phases of planning and design. Too often school officials and citizens tend to embark upon a school building project, without first adequately assessing their present facilities. Practitioners are also often negligent in establishing both comprehensive long- and short-range plans for their school districts, so that they have some type of concerted vision as to where they want their educational program to end up in the next 20-30 years. Simply because the sheer amount of technology and informational areas are increasing so rapidly, it becomes even more imperative that school officials broaden their knowledge base and not plan in a vacuum. More than ever before, educational practitioners must examine and become cognizant of global, societal, and educational trends that will possibly have a substantial impact upon the types of facilities, which they hope to build in the future.

If the planning and design team is composed of a pluralistic, broad-based blend of educators, planners, architects, and concerned citizens, who are united in their determination to formulate plans and designs based upon a solid knowledge base of research and study, then they have a much greater chance of avoiding knee-jerk reactions in their facility planning efforts. Instead, if planners carefully analyze present trends and educational innovations, they greatly increase the probability that they can more closely approximate the disparate and unforseen educational programs, which the future schools must undertake.

Part I: Identified Guidelines Related to Planning, Design, and Site Selection

Based upon a thorough review of the literature, interviews with facilities experts and educational practitioners, on-site school visits, and the information presented herein, the following guideline elements appear to be significant:

1. Prior to the selection of a formal planning group, a focus group of "key" individuals, who establish the parameters of the community's public school needs, e.g., funding mechanisms, should be initiated to begin roundtable discussions concerning future public school plans.

2. One of the first steps in the planning process for future public school facilities should be to establish a pluralistic, broad-based planning and design team composed of teachers, administrators, students, employees, architects, educational planners, parents, school board, and community members who are stakeholders in the school planning process.

3. For the planning and design process to be truly effective, it must place as much information in the hands of as many people as possible to get good feedback, suggestions, and imaginative interaction.

4. Planning should be bottom-up, not top-down.

5. Another initial step, before the planning and design process begins, is to institute a pragmatic and

thorough school survey of all the facets of the present educational programs and facilities currently available in the district.

6. If a current survey has not been accomplished, it is often most cost-effective and expedient for a school district to use the services of a competent, professional educational facility specialist to carry out these services.

7. Long-range, short-range, and strategic plans should be developed that are proactive in nature, rather than reactive and "knee-jerk" in scope.

8. The school facility plans that are developed must also be based not only upon "hard" statistical data but "soft" data, such as human attitudinal and perceptional information from the end users of the school facilities, such as teachers, administrators, and students.

9. Educational programs should be clearly defined and addressed in the educational specifications by the planners before any type of school design is actually drawn up.

10. Flexibility, mobility, and adaptability should be the cornerstone concepts of any school facility designed for the future.

11. Educational planners should carefully analyze present global, societal, and educational trends in order to increase the probability that they can more closely approximate the disparate and unforseen educational programs

that schools must undertake now and in the future.

12. Planning teams should be future-oriented and cognizant of the diverse types of spaces needed (quiet areas for individuals or groups; flexible, multi-purpose areas; tailor-made, special purpose classrooms or labs) for schools when they enter the design process.

13. One valuable source of planning information should be the collegially-shared building experiences of other education professionals, who have successfully completed a facility and can suggest ways to avoid pitfalls in the planning/building process.

14. The natural, environmental features of a school site should be considered for the potential contributions that they could make to curriculum areas such as science, and natural landscapes should be preserved to be used as nature trails and environmental teaching tools for students.

15. School sites should be selected with particular attention to those that are free of environmental hazards and restricting easements, have safe convenient access with good availability of transportation systems, have utilities available, are not heavily impacted by adjacent development constraints, and do not conflict with the long-range plans of state and local governing bodies.

16. School/community partnerships of shared land resources, such as adjacent parks or recreation areas, should be planned into the conceptual design of the school.

Part II: Environmental Enhancement Factors: Aesthetical, Psychological, and Behavioral

The need in America's public schools to create environments that are safe, secure, and inviting for both students and teachers has never been greater. As the pace of life increases and technology becomes omnipresent, it becomes imperative for school facility planners to interject their schools with an extra measure of "user-friendliness." Very often the tone of a school facility is set by the little things, such as the color of the walls, the openness of the entrance, and the feeling of security and belonging inherent in the aesthetic condition of the facility. Naisbitt (1982) reemphasized that high-tech environments must be made more congruent by the addition of high-touch elements. All public school facilities must be friendly, inviting spaces where both teachers and students can communicate, learn, explore, and relate to each other. The thoughtful, intelligent use of spaces that are filled with imaginative shapes, colors, and textures can make all individuals concerned feel that the school is a positive, caring, learning environment.

Just as important as the aesthetical and psychological considerations in any school facility are the sonic, thermal, and luminous environments, which can heavily impact upon the physical comfort, behavior, and ability to function optimally for both teachers and students. As educators and planners attempt to design and build school facilities, which will fulfill the educational mission of the 21st century, it is important to realize that they cannot change the educational programs without concomitant changes in the ancillary systems of the facility, such as climate control, acoustics, and lighting. No type of innovative program or service can operate at peak efficiency, unless the occupants of the facility are physically comfortable. Whatever the planner can do to enhance the comfort of the facility user will add immeasurably to the success of the project. This is perhaps best achieved by bringing the school facility environment in consonance with the natural environment as closely as possible. Very little psychological achievement is gained if a school facility is placed on a beautiful site, and the users are placed in rooms without the benefit of windows and natural light in which to enjoy the natural beauty that surrounds them. Visible trends in school architecture seem to emphasize the increased use of skylights, clerestories, atriums, and indirect lighting in an effort to bring in more of the outside world and place the school facility in a more compatible arrangement with the environment.

Identified Guidelines Related to Environmental Enhancement

Based upon a thorough review of the literature, interviews with facilities experts and educational practitioners, on-site visits, and the information presented herein, the following guideline elements appear to be significant:

1. The public school facility should be child-centered and "user-friendly."

2. School designs should be both psychologically and aesthetically pleasing to students, teachers, and parents in myriad ways.

3. The environment of the school facility is designed to offer a place with spaces where both students and teachers can learn, explore, and relate to each other in creative ways and in different size groups.

4. There should be comfortable, noninstitutional, home-like environments within schools that emphasize a warm, caring attitude towards students and teachers.

5. School facilities should be designed with environments that impart a feeling of safety, security, and belongingness for all the individuals involved.

6. Environmental enhancers such as natural lighting sources and visual "vistas" should be used to promote the psychological well-being of students, teachers, and other faculty users.

7. Both teachers and students should have some type of individualized spaces (workrooms, lockers, or "cubbies") that can be personalized.

8. The exterior of the school facility should be aesthetically designed to say "Welcome and Come In" to students, parents, and community members.

9. The immediate visual impression of the entire school facility should be a welcoming one by the creative use of colors, graphics, and decorative textures.

10. School facilities should "fit" into their environment, naturally and comfortably. Whenever possible, they should be emulate the surrounding environment and grow consciously from it in a congruent manner.

11. Maximum natural lighting via the judicious use of windows and innovative window treatments, such as clerestories, skylights, or atriums, should be a requisite standard in school facilities of the future.

12. The highest level of comfort for students, teachers, and other employees should be aspired for through the use of high-tech, well-designed climate control, acoustics, and lighting systems.

13. The optimal physical comfort of all individuals in the facility should be of the utmost importance in order that efficacious teaching and learning can take place.

Part III: Space Utilization

The monumental task facing all facilities planners, is to create functional flexible types of spaces that will adequately serve the diverse student population and school curricula, which is anticipated in the next quarter century. Armed with statistics and informational data, planners must try to envisage facilities spaces that will house programs that may not even be invented at this time.

Most educational facility planners will agree that the school facility spaces must be aesthetically pleasing, energy efficient, cost-effective, and totally functional, but they often forget the touchstone ingredient for a truly effective future facility -- the flexibility of the spaces. In general the benchmark for any facility must be its ability to be pliant and malleable. In order to weather the myriad curricula and program changes that will take place in the future, interior spaces must be designed, so that they can house programs that may not even be envisaged at the present time. The space today that must accommodate one program, may be forced in several years to house a very divergent program or service. Student populations will change, as will federal mandates for special classes, educational programs, and social services. It is incumbent upon the facilities to be tractable and compliant to these unexpected diverse needs in the future. In most cases, it will behoove educational planners and practitioners to build in this flexibility/adaptability factor into the spaces, which are designed. Very often, it is much less expensive to build in flexibility than to retroactively add it on at a later time.

These special spaces must also be designed with an unwavering focus towards creating the types of comfortable, enriched, relaxed environments in which students and faculty will be eager to synergistically learn and work together. This ecologically-oriented environmental concept, where planners build innovative spaces that will hopefully bring about a greater capacity for learning and cooperation, are capable of high-powered results.

Architects and educational facility planners are learning that students, like adults, need their own personalized spaces, just as they have at home. Public school facilities have begun to de-institutionalize their traditional spaces, such as student's lockers and hall transition areas, in order to soften the school environment and create a more familial type environment for the students. Many schools have even tried to create a friendly shopping mall type atmosphere in order to give students something special. Planners and architects have begun to realize that students need quiet times and personalized spaces for conversation and social development. Schools are justifiably learning that, just as in their own home environment, students need spaces that they can identify with and feel belong exclusively to them. More and more public school facilities have created student commons areas, located in both the interior and exterior portions of the facility, where students can relax and socialize outside the confines of the classroom. Brubaker (1990) succinctly captured the vital essence of what all educational planners and practitioners must aspire to create in the facilities' spaces of the future, when he stated: "Learning spaces [must] first be people places" (p. 15)

Identified Guidelines Related to Space Utilization

Based upon a thorough review of the literature, interviews with facilities experts and educational practitioners, on-site school visits, and the information presented herein, the following guideline elements appear to be significant:

1. The benchmark concept for designing all future school facilities should be the flexibility of spaces that can encourage experimentation, experiential learning, and different teaching concepts.

2. In general, classrooms should be of an appropriate size to allow for informal settings and non-traditional arrangements of desks or chairs, so as to encourage group collaboration.

3. In many instances, classrooms of the future will have to be larger than usual to carry out the more complex

and numerous curricular activities.

4. The Instructional Media Center should be designed to be the central focus of the facility and serve as an informational storage center and a hub for communication technology.

5. When discrete traditional classrooms are planned, they should be designed to incorporate maximum functional flexibility for the accommodation of future program changes, which are not even known at this time.

6. Movable partitions, demountable or folding walls, and redeployable spaces are viable ways of maximizing the flexibility of spaces in a future school facility.

7. Future classrooms should be designed in ways that will not isolate students or teachers from participation in collaborative learning and teaching.

8. Classroom spaces must be as fluid and malleable as the programs that they serve. Whenever possible, classrooms should be designed to allow free movement of students from one location to another with ease and without obstructions.

9. The individual classroom of the future should be designed with appropriate high-technology to allow it to function as its own specialized learning center.

10. There should be quiet, private, individual spaces for parents, students, and teachers to conference.

11. Teaching staff should have individualized work

areas for planning and preparation in close proximity to their classrooms.

12. Information and resource areas should be tailor-made and larger than usual with special spaces for students to read, work in groups, and conference with teachers, plus additional storage spaces to accommodate expanded amounts of resource materials, information, and communication technology.

13. At appropriate grade levels, there should be multi-purpose laboratories to be used holistically in a variety of curricular programs.

14. There should be myriad individualized and module computer and instructional workstations in each classroom, linked to a central media center to access information.

15. For appropriate age groups, there should be generic, flexible spaces designed to support and accommodate real-life simulations, such as weather stations, television studios, aerospace modules, or mock entrepreneurial businesses.

16. Future school facilities should have special, designated spaces that can be designed specifically for child care, pre-, and after-school day care of the infants and children of students, teachers, school workers, and community members.

17. There will be a need for specialized, broad-based prototypical lab spaces, tailor-made to support newly

designed Instructional Technology programs.

18. There should be special-purpose rooms, designed technologically appropriate and exclusively for curricular areas, such as Band, Art, Theatre, Science, and Music.

Part IV: Technology

How can schools plan and build the types of all-encompassing types of spaces that will adequately house the technological programs and services that may not yet even be envisioned for the future? Almost everyone is in agreement that the worldwide trend towards higher technology will affect public schools of the future, but the unanswered question is how much and in what ways? All educational planners and practitioners must make these important decisions in order to bring their school systems on-line with 21st century technology. If history is any indicator of the type and speed of educational technological innovation and change, these things will evolve very slowly. The resistance to change and the implementation of technology can often be aided by the active involvement of teachers in the decision-making process, so that they will be participative partners in resulting changes. Many school systems have found that by providing teachers and administrators with specialized training, so that they can become more familiar with the types of technology available, breaks down their fear and resistance to these changes.

Different school systems approach the problem of how to bring the myriad types of available technology into their schools in many diverse ways. Most planners and administrators sense that, if properly planned and used, technology is a requisite imperative for schools to remain effective, competitive, functional institutions into the 21st century. Most importantly, technology must be used as an educational tool and expediter; not as a baby sitter or substitute for poor teacher planning.

It is imperative to remember that regardless of the level of technology chosen for the school facility, the overall direction that the technology takes must be in consonance with the goals of the district and the state school system. If the superintendent and school board do not "buy into" a technology paradigm, there is very little chance that the school system will ever be very technologically innovative. Additionally, many systems have found that the piecemeal approach to purchasing technology is not effective, unless there is a strategic plan established for the orderly implementation of a technology system. Some of the best results seem to have been achieved when the superintendent, school board, and facilities planner (who must all be technologically astute and forward-thinking) sit down and draw up a technological timeline for the school system; that is where the system wants to be on the technology continuum and when it wishes to be at each stage of implementation. Very often, teachers are too busy with their immediate concerns of allocation of classroom space and students to become totally involved in technological concerns. The school administrators, facilities planner, and the architect must look down the road far enough ahead to plan for the future implementation of the types of technology and the spaces to house it that will be necessary for the school facilities of the 21st century.

Because many school systems can be justifiably daunted by the monetary impact of expensive educational technology, they are often reluctant to "buy into" high-tech programs, which they can barely understand and hardly afford. Tapping into the 21st century is an expensive proposition, but there are very few alternatives available that will offer the flexibility of individualized instruction that technology offers to students and teachers.

Most schools systems, which want to participate in bringing their schools on-line with the 21st century, will usually concentrate on several key areas first: (a) data and information processing, (b) communication, and (c) video and instructional media distribution. These are broad, loosely-coupled categories that cross and overlap with each other. Technology is such a broad area that can include everything from the implementation of a wind tunnel in a physics lab, to a robotics module in industrial design, or a state-of-the-art graphics art computer studio; all of these areas need special places in the implementation of school facilities of the future.

Identified Guideline Elements Related to Technology

Based upon a thorough review of the literature, numerous interviews with facilities experts, and educational practitioners, on-site school visits, and the information presented herein, the following guideline elements appear to be significant:

1. A technology specialist should be employed by the school system to guide the school in its selection of technology equipment and to train teachers and students in its proper implementation.

2. Future school facilities designs should be as open-ended as possible to allow for future technological growth by the incorporation of larger cable trays and conduit, multiple communication lines (e.g., fiber optics), and extra "clean" power sources for computers, etc.

3. High-technology growth should be facilitated by the judicious use of pre-wired, multi-purpose labs that are flexible enough to serve divergent programs.

4. Three key areas of technology augmentation should include data and information processing, communication, and video and instructional media.

5. Future schools should be cognizant of the need to network by means of satellite learning and long distance telecommunication technology, as a means of equitably sharing resources and promoting global awareness for students.

6. Whenever possible, schools should examine the possibility of investing in specialized, experiential, hands-on technology used to teach real-life skills in multi-purpose areas such as television and video production studios, radio and weather stations, space mockups, or solar greenhouses.

7. Schools should incorporate high-tech record keeping and information gathering equipment for administrative duties.

8. Electronic technology, such as voice mail, and computer and video communication/networking to other schools and geographical areas should be evidenced in schools of the future.

9. Telecommunication centers (telephone, intercom, security, etc.) in individual classrooms should be available for all teachers to show greater professionalism.

10. Some mobile, pre-wired, plug-in technology modules, cubicles, or workstations for individualized and small group instruction should be implemented in most classrooms of the future.

11. "Smart buildings" with energy efficient,

high-technology HVAC control systems should be employed in schools of the future.

12. Classrooms of the future should have some computer modules and learning centers linked to a central media center for individualized instruction via computers, ETV, or satellite systems.

13. Flexibility, movability, and open-ended adaptability to add on new technology as needed are the key linchpins to successful schools built for the future.

14. When dealing with high-tech equipment, schools should plan for classrooms that are ergonomically designed with demountable walls, movable visually comfortable light fixtures, and flexibly wired workstations.

Part V: School and Community Service Areas

For the most part, communities have the types of schools that they want. Given the tight school budgets and fiscal restraints that are rampant almost everywhere in this country, many communities and school districts have banded together more closely and found that they can have better quality school facilities and services if they plan carefully and share resources. The school/community partnership offers an opportunity for a cooperative synergistic alliance, whereby school and communities can work together and share both facilities and services in the interest of convenience and avoidance of duplication. In order to conserve valuable tax dollars and to garner a broader public support, schools and communities have found that increased use of facilities makes good sense for everyone. The use of the "educational park" concept seems to be growing, and this type of shared recreational facilities allows everyone to have nicer areas which are more cost-effective.

The quality of the school building is the most visible message that the community sends to students, teachers, and parents that it really cares about them. Research trends indicate that the schools of the future will indeed be oriented more towards the "community school" concept, in the sense that the school will serve not only students but community members as well. The community school will contain learning centers for both children and adults and perhaps a neighborhood cultural, recreation, and wellness center. Many school districts have serendipitously found that they could maintain first class athletic facilities, such as olympic swimming pools, only with a strong community support and backing in these shared facilities.

Schools of the future will even share library resources with the community library, as well as being the hub for school and community health, social, family-support, and occupational services. Schools will of necessity have to be open more hours of the day, be more easily accessible to community members, and provide for all types of high quality before- and after-school for children from infancy to school-aged.

A new spirit of two-way openness will likely develop between the schools and the communities, whereby the adults will come into the schools more often for learning and services, and students will use the community as a learning resource center by using the libraries, museums, radio stations, television studios, industrial plants, and citizenry as tools for learning. This spirit of cooperation and sharing will additionally be made richer by the partnerships formed with business and industrial alliances.

Identified Guidelines Related to School and Community Service Areas

Based upon a thorough review of the literature, interviews with facilities specialists and educational practitioners, on-site school visits, and the information presented herein, the following guidelines appear to be significant:

1. Whenever possible, schools should attempt to find ways to share facilities and resources with their community.

2. Future school facilities should reflect the need for increased daycare, and before- and after-school care of infants and children of students, teachers, employees, and community members.

3. Schools should serve as an integral community hub for medical, social, family-support, and occupational services for students and parents.

4. Schools of the future should be facilities that are designed to serve as lifelong learning centers for both students and community citizens.

5. Future schools should be designed and planned with a new spirit of two-way openness, whereby students will use the community as a learning resource center by utilizing libraries, museums, businesses and citizenry as learning tools, and adults will come into the schools more often for learning services, recreation, and community activities.

Summary

The purpose of this chapter was to identify guideline elements for planning future public school facilities. It was not the intent of the chapter to include every minute detail necessary for the effective planning of public school facilities, but rather to present those guidelines that have been strongly evidenced by research, trends, interviews with educational planning specialists, and on-site visits to innovative schools. This chapter presented selected guidelines that would cover certain basic areas of school planning that should be considered in even greater depth by the educational practitioner in the actual planning process. Key areas considered essential, for which guideline elements were established, were: (a) Planning, Design, and Site Selection; (b) Environmental Enhancement Factors; (c) Space Utilization; (d) Technology; and (e) Community and Service Areas.

The guideline areas concerning planning, design, and site selection proved to be some of the most important, simply because they are often hastily covered or thought out in the interest of expediency. Too often school planning committees rush hurriedly through the actual planning process without stopping long enough to thoroughly examine their current facilities. Very few in-depth school surveys are undertaken by school districts, which become caught up in the hurly-burly frenzy of the actual building process. Many administrators are eager to strike into the bricks and mortar building process immediately, once funds have been approved and allocated. School districts that do not plan in a vacuum should carefully outline both long-range, short-range, and strategic plans for their districts. Before the process proceeds very far, they should also institute a pragmatic, thorough assessment of their current educational facilities by a qualified professional educational facilities planning specialist. Moreover, the school district must also insure that the school planning team is as pluralistic and broad-based as possible. Planning must be accomplished in a proactive manner from the bottom-up, not the top-down. Above all, the underpinnings for all future school facility plans must be the concepts of flexibility, mobility, and adaptability.

The environmental enhancement of the school facility is of the utmost importance to the psychological well-being of all its users. Because of the accelerated pace of life and the tremendous influx of technology in everyone's lives, school facilities of the future must create environments that exude an ambience of being safe, secure, and inviting places to be. Additionally, the physical safety of all the facility inhabitants must be of paramount importance at all times. This can best be reflected in the location and types of entry and exit doors and the judicious positioning of the administrative office areas.

The spaces that are created must be as aesthetically pleasing as possible, in order that the inhabitants can feel welcome and invited. The thoughtful use of innovative colors, textures, and designs will insure not only a better environment for students and teachers to relate and work together, but also allow all users of the facility to feel that the school is a positive, caring, learning environment.

Other preeminent considerations above and beyond the psychological and aesthetic are the sonic, thermal, and luminous environments of the facility. The optimal physical comfort of all the individuals in the school building can be insured by the highest quality climate control and lighting systems. Whatever the planner can do to increase the physical comfort of the facility inhabitants will add considerably to the success of the project. Most importantly, the innovative and judicious use of window treatments can augment the environmental enhancement of the facility and the enjoyment of its users.

One of the most problematic areas of planning future school facilities, which are built to last 50-100 years, involves the types of spaces that must be designed to house educational programs that may not even be envisaged at this time. Educational planners must create functional, flexible spaces that can be as pliant and malleable as possible. Flexibility is the benchmark concept and touchstone ingredient for truly effective future public school facilities.

By environmentally designing safe, comfortable, flexible spaces where individuals feel secure in a home-like environment, devoid of institutional earmarks, architects and facility planners are learning to provide various types of spaces where all types of learning can take place. There will be ergonomically-designed comfortable, quiet spaces for conversation or reflection; versatile spaces for individual and collaborative learning; personalizable spaces; and open spaces for relaxation and socialization, above and beyond the flexible classroom spaces needed for all subject areas. All learning spaces must first be designed to be people places to be truly effective in the future.

In order to come on-line with the appropriate kinds of technology to meet the demands of the 21st century, school districts must first train teachers to use technology properly, as a learning tool. Realizing that appropriate amounts of technology are imperative for schools to remain effective, competitive, functional institutions in the next century, school districts must "buy into" the technology paradigm and develop strategic plans for the orderly integration of it into their districts. Very often, the best way to accomplish this task, is to hire a professional technology specialist to guide the orderly planning, implementation, and use of technology in the schools. The three key areas of technology implementation usually include: (a) data and information processing, (b) communication, and (c) video and instructional media distribution.

For the most part, communities have the quality of schools that they desire. Many schools and communities have found that by working synergistically together to share facilities and resources, they can have better quality at a smaller cost. The "community school" concept is growing in the sense that the school and community will welcome each other into their environment more readily. There is a new spirit of two-way openness developing, whereby schools will be more amenable to providing additional services for the community, which will in turn welcome students and serve as a valuable learning resource center for them.

CHAPTER 5

Guideline Ratings

Introduction

The identification and validation of the guidelines for planning future public school facilities was one of the most important phases of this research project. The methodology and procedures for sources and materials used in selecting the guideline elements were discussed in Chapter 3. The actual development of the guideline elements was explained in Chapter 4.

In order to validate the guideline elements selected in Chapter 4, a jury of facility planning specialists (see Appendix B for the list of the members of the jury) was asked to rate the previously selected guideline elements. After the initial pilot test by three facility planning specialists, a letter of explanation and a questionnaire/rating sheet was sent out to a jury of 13 additional facility planning specialists (100 % Response) who were chosen by the author for their various areas of expertise in school design and planning. The facilities questionnaire (see Appendix C) contained a cover sheet that explained the purpose of the study and the scope of the guideline elements to be rated. Each participant was given very specific, detailed instructions on filling out the questionnaire, including areas in which to place additional guidelines and comments.

Each guideline element could be rated on a scale as high as 5 or as low as 1. Thus the highest number of points that any one guideline could receive was 65. Ratings were given to each proposed guideline element according to the following scale:

Essential	5
Highly Desirable	4
Significant	3
Little Significance	2
Not Applicable	1

<u>Essential</u>

An element that would be necessary in planning future public school facilities.

<u>Highly Desirable</u>

An element that is not absolutely necessary but would be of functional value in planning future public school facilities.

<u>Significant</u>

An element not necessary but would have some functional value in planning future public school facilities.

Little Significance

An element holding little value even though its presence would not harm the planning process.

Not Applicable

An element that would have no value in the school planning process.

The proposed guideline elements were categorized into five important sections: (a) Planning, Design, and Site Selection; (b) Environmental Factors; (c) Space Utilization; (d) Technology; and (e) School and Community Service Areas. Please see Appendix C for the exact terms of the guideline statements as they appeared on the rating sheet. Those guidelines securing a mean value of 4.5 or better were declared essential. Guidelines receiving a mean value of 3.5 but less than 4.5 were considered highly desirable. Any guidelines that received a mean value of at least 3.0 but less than 3.5 were considered significant. Guideline statements that received a mean value of less than 3.0 were not considered by the investigator and were not suggested as guidelines for planning future public school facilities (see Appendix D for individual ratings given by each specialist on each guideline element). Each statement was then also rank ordered according to the mean weight with a numerical 1 being the highest rank and numerical 66 being the lowest ranked statement. Jurors were also given the opportunity of listing and rating additional guidelines. Pertinent comments made by members of the jury were included in the findings.

Jury Ratings of Guideline Elements

Part I: Planning, Design, and Site Selection

Part I of the questionnaire consisted of 16 in-depth statements, which concerned areas in the planning, design, and site selection of future public schools. Table 1 briefly summarizes the element statements (see Appendix C for full statements) and illustrates that all 16 statements in this section received ratings of 3.0 or better. Statement eight received the highest rating of 4.85, which was also the highest of all the 66 statements in the questionnaire. Statements nine and 15 tied for the second highest ratings of 4.62 in this section. Statement 13 received the lowest rating of 3.85. Four statements were rated essential and 12 were rated highly desirable.

This first area of the questionnaire also elicited some very interesting responses and comments from the jurors. The following are a few of the significant and helpful thoughts put forth concerning some of the statements:

1. Regarding statement two, one respondent stated that in a planning and design team "all interests should be

Table 1

Panel Ratings of Part I: Planning, Design, and Site Selection Guideline Elements

1. Before the school planning process begins, a group of "key" individuals begin roundtable discussions.

E	HD	S	LS	NA	Mean	Ranked Order
4	7	2			4.15	34

2. A pluralistic, broad-based planning team is set up.

E	HD	S	LS	NA	Mean	Ranked Order
8	4	1			4.54	8

3. Planning process places as much information as possible in the hands of the maximum number of stakeholders.

E	HD	S	LS	NA	Mean	Ranked Order
6	6	1			4.38	15

4. Planning should be bottom-up, not top-down.

E	HD	S	LS	NA	Mean	Ranked Order
6	6	1			4.38	16

5. A thorough school survey is initiated.

E	HD	S	LS	NA	Mean	Ranked Order
6	5	1	1		4.23	32

6. A professional facility planner should do the survey.

E	HD	S	LS	NA	Mean	Ranked Order
3	5	5			3.85	53

(Table Continues)

Table 1 (Continued)

Panel Ratings of Part I: Planning, Design, and Site Selection Guideline Elements

7. All types of planning should be proactive in nature.

E	HD	S	LS	NA	Mean	Ranked Order
8	3	2			4.46	11

8. Planning is based on both "hard" and "soft" data.

E	HD	S	LS	NA	Mean	Ranked Order
11	2				4.85	1

9. Programs are defined in educational specifications.

E	HD	S	LS	NA	Mean	Ranked Order
9	3	1			4.62	5

10. Flexibility, mobility, and adaptability are cornerstone concepts of the school design process.

E	HD	S	LS	NA	Mean	Ranked Order
7	3	3			4.31	23

11. Trends are important for future school planning.

E	HD	S	LS	NA	Mean	Ranked Order
3	6	4			3.92	48

12. Planning teams must be cognizant of all types of diverse spaces needed in future schools.

E	HD	S	LS	NA	Mean	Ranked Order
5	8				4.38	17

(Table Continues)

Table 1 (Continued)

Panel Ratings of Part I: Planning, Design, and Site Selection Guideline Elements

13. Collegially-shared building experiences aid planning.

E	HD	S	LS	NA	Mean	Ranked Order
3	5	5			3.85	53

14. Environmental features of site should be considered as possible contributors to the curriculum.

E	HD	S	LS	NA	Mean	Ranked Order
4	9				4.31	24

15. School sites should be carefully selected.

E	HD	S	LS	NA	Mean	Ranked Order
8	5				4.62	6

16. Plans should include school/community partnerships.

E	HD	S	LS	NA	Mean	Ranked Order
3	8	2			4.08	40

represented, but if the group is too large--nothing will happen." Another juror advocated that the planning group or steering committee should not exceed 25 individuals.

2. Three jurors stated that in statement four, planning should be both ways, not just top up. For this reason, this suggested change made the guideline element read: <u>Planning should be both top-down and bottom-up.</u>

3. In reference to statement six, concerning the need for a school survey the school survey to be conducted by an educational facility planner, one juror wrote that "often these planners encourage 'status quo' or 'industry standards'--Imagination <u>must</u> be the key." Another respondent stated that in conducting a school survey it is "best to have a team--individuals with expertise in programs, finance, facilities, etc." A third juror in reference to the statement six replied that "most districts <u>do not</u> have qualified staff" to professionally execute a quality school survey.

4. Pertaining to statement 10, which concerned the need for flexibility in future schools, one juror stated that flexibility is important "to a point--we can get so flexible that the facility doesn't do anything well." Another respondent marked down the statement because "Safety, function, and life cycle costs are <u>more</u> important."

5. In relation to statement 11, one juror adamantly wrote: "The planner cannot be all things to all people."

6. Concerning statement 13, which talked about the value of collegially shared building experiences, one specialist stated that "This can also support the institutionalization of <u>bad</u> ideas."

6. On the need for shared school/community land resources in statement 16, one expert explained that the Minneapolis (Minnesota) school district shares 25 sites with city parks.

Part I of the questionnaire included a variety of comments, which indicated that many of the specialists held very strong viewpoints concerning the importance of the school planning, design, and site selection processes. The second suggested addition to the elements was by one juror who stated: "In some manner you should include the planner's responsibility for quality control to include building systems and other components." Based upon this suggestion, the following guideline was placed in Part I of the final list of guideline elements for planning future public school facilities: <u>In planning future public school facilities, it should be the planner's responsibility for the final quality control of the facility, including building systems and other components.</u>

Part II: Environmental Factors: Aesthetic, Psychological, and Behavioral

The second area of the questionnaire consisted of 13 statements concerning the importance of selected aesthetic, behavioral, and psychological environmental factors on the public schools planned for the future.

Table 2 illustrates the ratings by the jury members of the 13 elements in this section. Three statements were rated as essential, nine as highly desirable, and one as significant. Statements one and two tied for the highest essential ratings of 4.85, while statement 11 received the lowest rating of 3.38.

Part II of the questionnaire elicited as many comments and polemical responses as any of the other sections. Some of the most informative and beneficial thoughts on the statements concerning the environmental factors that impact upon future school facilities were the following:

1. Several jurors were concerned that statement four was especially important in elementary schools, when in fact in was written to apply to all public school facilities. One respondent felt that it was the duty of the staff to create comfortable, noninstitutional, home-like environments. Another specialist wondered: "Does it have to be noninstitutional and home-like to be warm and caring?"

In order to avoid further confusion, when put forth as a guideline, statement four read: There should be comfortable, noninstitutional, home-like environments within all schools that emphasize a warm, caring attitude towards students and teachers.

Table 2

Panel Ratings of Part II: Environmental Factors: Aesthetic, Psychological, and Behavioral Guideline Elements

1. Schools should be child-centered and "user-friendly."

E	HD	S	LS	NA	Mean	Ranked Order
11	2				4.85	2

2. School designs should be pleasing to all concerned.

E	HD	S	LS	NA	Mean	Ranked Order
11	2				4.85	3

3. School environments should be spaces where students and teachers can learn, explore, and relate.

E	HD	S	LS	NA	Mean	Ranked Order
10	2	1			4.70	4

4. School environments should be warm, comfortable, secure, and home-like.

E	HD	S	LS	NA	Mean	Ranked Order
5	5	2	1		4.08	41

5. School environments should impart a feeling of safety, security, and belongingness.

E	HD	S	LS	NA	Mean	Ranked Order
6	6	1			4.38	18

6. Facilities need environmental "enhancers."

E	HD	S	LS	NA	Mean	Ranked Order
5	4	4			4.08	42

(Table Continues)

Table 2 (Continued)

Panel Ratings of Part II: Environmental Factors: Aesthetic, Psychological, and Behavioral Guideline Elements

7. Teachers and students should have individualized spaces.

E	HD	S	LS	NA	Mean	Ranked Order
3	6	4			3.92	49

8. Exterior of school facility should be welcoming.

E	HD	S	LS	NA	Mean	Ranked Order
7	4	2			4.38	19

9. Visual impression of the school should be enhanced by colors, graphics, and textures.

E	HD	S	LS	NA	Mean	Ranked Order
5	7	1			4.31	25

10. School facilities should "fit" in their environment.

E	HD	S	LS	NA	Mean	Ranked Order
5	4	4			4.08	43

(Table Continues)

Table 2 (Continued)

Panel Ratings of Part II: Environmental Factors: Aesthetic, Psychological, and Behavioral Guideline Elements

11. Maximum natural lighting should be a requisite standard of future school facilities.

E	HD	S	LS	NA	Mean	Ranked Order
4	3	3	1	2	3.38	62

12. Highest level of comfort should be aspired for facility inhabitants via high-tech systems.

E	HD	S	LS	NA	Mean	Ranked Order
8	3	2			4.46	12

13. Optimal physical comfort of individuals should be of the utmost priority.

E	HD	S	LS	NA	Mean	Ranked Order
5	7		1		4.23	32

2. In regards to statement eight, one juror commented that the exterior of a school facility "should also make a value statement about public education."

3. Statement seven on the need for individualized "cubbies" for students elicited several positives, such as "YES! YES!"

4. Statement 10, which concerned the need for the school facility to "fit" and emulate the environment, drew several comments from jurors who felt that in certain situations schools "should not fit all environments" or "in some cases, you might not want to emulate the neighborhood." One specialist suggested that "sometimes contrast with the environment can work well too!"

5. Statement 11, which expressed the need for the maximum natural lighting as a requisite standard for schools of the future, drew one very adamant response from a juror who suggested: "HELL NO! Why go back to the 50% window regs [sic] of the 20s, 30s, 40s, 50s?" The primary concern by several jurors was the use of the word requisite; many specialists did not feel comfortable with this part of the element. Another juror suggested that "Let's not forget to be energy conscious too!" Based upon these responses, the word requisite was deleted from the guideline element.

6. Two school facility planning specialists stated that the highest level of comfort in statement 12 could be achieved not necessarily by high-tech systems. One expert

suggested that "This [comfort] can be delivered thru 'good design'--not necessarily high-tech gadgetry." Another respondent concluded that it is "better to use natural systems when possible."

7. Statement 13, which concerned the need for the optimal physical comfort of individuals within the school facility, elicited this response from one expert: "With today's single parents and broken homes, often the school is the 'most comfortable' place that the student is exposed to." Another specialist felt that "psychological [comfort] is more important" than physical comfort.

Part II of the questionnaire, concerning the need for aesthetic, behavioral, and psychological environmental factors in the design of future public school facilities, elicited many valuable comments and suggestions, which allowed the specialists to put forth their concerns and attitudes towards the true value of these factors. Because of their ratings and suggestions, some important words were modified in several guideline elements.

Part III: Space Utilization

This section of 18 statements concerning the types of space utilization in future public schools garnered some excellent responses, comments, and suggestions. Table 3 illustrates the results of the ratings given by the jury on the 18 guidelines for space utilization. Ratings ranged

Table 3

Panel Ratings of Part III: Space Utilization Guideline Elements

1. Flexibility of space design is the benchmark concept for the design of future school facilities.

E	HD	S	LS	NA	Mean	Ranked Order
8	3	2			4.46	13

2. Classroom size should allow for group collaboration.

E	HD	S	LS	NA	Mean	Ranked Order
7	6				4.54	9

3. Future classrooms may have to be larger than usual.

E	HD	S	LS	NA	Mean	Ranked Order
3	4	3	2	1	3.46	61

4. Media Center should be the central hub of the facility.

E	HD	S	LS	NA	Mean	Ranked Order
4	7	1	1		4.08	44

5. Discrete classrooms should be designed for maximum flexibility.

E	HD	S	LS	NA	Mean	Ranked Order
4	6	3			4.08	45

6. Movable partitions and demountable walls are valid ways for maximizing flexibility of spaces.

E	HD	S	LS	NA	Mean	Ranked Order
1	6	3	3		3.38	63

(Table Continued)

Table 3 (Continued)

Panel Ratings of Part III: Space Utilization Guideline Elements

7. Classrooms should not isolate students or teachers.

E	HD	S	LS	NA	Mean	Ranked Order
5	6	1	1		4.15	35

8. Classroom spaces must be fluid and malleable.

E	HD	S	LS	NA	Mean	Ranked Order
5	5	3			4.15	36

9. Individualized classroom should be a technology center.

E	HD	S	LS	NA	Mean	Ranked Order
5	4	3	1		4.00	46

10. There should be quiet, private spaces for conferencing.

E	HD	S	LS	NA	Mean	Ranked Order
7	5	1			4.46	14

11. Teaching staff should have individualized work areas.

E	HD	S	LS	NA	Mean	Ranked Order
5	7	1			4.31	26

12. Information and resource areas should be tailor-made.

E	HD	S	LS	NA	Mean	Ranked Order
2	6	4	1		3.69	56

(Table Continues)

Table 3 (Continued)

Panel Ratings of Part III: Space Utilization Guideline Elements

13. At appropriate grade levels, there should be multi-purpose laboratories.

E	HD	S	LS	NA	Mean	Ranked Order
1	6	5	1		3.54	60

14. Classrooms should have individual computers and modules linked with the Media Center.

E	HD	S	LS	NA	Mean	Ranked Order
3	7	2		1	3.92	50

15. There should spaces for real-life simulation experiences, such as TV studios or space mockups.

E	HD	S	LS	NA	Mean	Ranked Order
1	4	7	1		3.38	64

16. Future school facilities should have all types of spaces for childcare, and pre- and after-school care.

E	HD	S	LS	NA	Mean	Ranked Order
4	4	3	2		3.62	58

17. There should be special lab spaces designed for Instructional Technology.

E	HD	S	LS	NA	Mean	Ranked Order
3	7	1	2		3.85	54

18. There should be special-purpose rooms for Band, etc.

E	HD	S	LS	NA	Mean	Ranked Order
6	5	2			4.31	27

from a high of 4.54 to a low of 3.38. Statement 11 was considered essential, while 14 statements were felt to be highly desirable, and three were considered significant by the specialists.

All of the following comments and suggestions concerning guideline statements were considered of great benefit to the researcher:

1. Regarding statement one, which addresses the benchmark design concepts for future school facilities, a respondent suggested that "efficiency and student management" should also be included. Another specialist felt that modern buildings with non-load bearing walls that can easily be remodeled was a valuable possibility. A third expert felt that flexibility "does <u>not</u> necessarily mean movable walls and the like."

2. Statement three, regarding the possible need for future classrooms to be larger, elicited several pertinent comments from specialists. One juror observed that there is "a danger in large size classrooms = too large class size!" Another respondent simply stated that "maybe they should be smaller!" One specialist noted: "No--Remodel as needed." Finally, one expert felt that the term "classrooms of the future may be an oxymoron."

3. Statement six, concerning movable partitions and demountable walls, caused several experts to issue their opinions. One respondent stated that "they were costly and

seldom used," while another specialist wrote that "these do not work very well and have noise problems."

4. Regarding statement eight, one expert simply stated "School buildings should not be 'custom designed'" for students.

5. In reference to statement 14, which involved individual workstations and modules, one juror remarked that the quantity depended upon the grade level. Another specialist agreed with the statement and said "Yes, but [the workstations] should not cause the rooms to be larger." A third expert simply stated: "There should be laptops for everyone."

6. Statement 16 about special, designated, child-care spaces elicited two responses. The first respondent said, "Yes, but these activities will create greater space needs." The second comment simply stated: "Schools--All things to all people?"

Part III of the questionnaire concerning the space utilization needs of future public school facilities seemed to bring out the core beliefs of some of the respondents. The quality of the responses and the timeliness of the comments and suggestions were of great benefit to this section of the research project. Based upon the suggestion of one specialist, an additional guideline element was added to this section. It read as follows: <u>In future schools, noninstructional space (corridors, cafeterias, commons,</u>

etc.) should be designed to become part of the informal learning/social development environments.

Part IV: Technology

Table 4 shows that all 14 statements concerning the types of technology necessary for schools of the future received ratings by the jurors of 3.0 or greater. None of the statements were rated as essential, but 13 were considered to be highly desirable, and one statement was felt to be significant. The ratings ranged from a high of 4.38 to a low of 3.38.

The following comments and suggestions by jurors concerning the statements on technology were felt to be very informative:

1. Statement two, which addressed the need for open-ended capabilities for future technological growth, elicited a very incisive comment from one juror who rated this statement highly desirable: "Yes, it's needed but very expensive to accomplish and involves a lot of guesswork. [It] would be much better to design schools such that these items could be added later in their entirety. This allows for dollars to be spent for what's required, not what you think will be required in the future. Thus design schools with accessible ceiling and chase spaces for installation in the future of not just wiring but also the conduits, etc." Rating the statement highly desirable also, another juror

Table 4

Panel Ratings of Part IV:

Technology Guideline Elements

1. A technology specialist should be employed by the school district to serve as an implementation guide.

E	HD	S	LS	NA	Mean	Ranked Order
4	7	2			4.15	37

2. School facility designs should be open-ended to allow for technological growth.

E	HD	S	LS	NA	Mean	Ranked Order
5	6	1	1		4.15	38

3. High-technology should be facilitated by the judicious use of pre-wired, multi-purpose labs.

E	HD	S	LS	NA	Mean	Ranked Order
3	3	7			3.69	57

4. Three key areas of technology should include data and information processing, communication, and media.

E	HD	S	LS	NA	Mean	Ranked Order
5	7	1			4.31	28

5. Future schools should be networked for satellite learning and long distance communication.

E	HD	S	LS	NA	Mean	Ranked Order
2	9	2			4.00	47

(Table Continues)

Table 4 (Continued)

Panel Ratings of Part IV:

Technology Guideline Elements

6. Schools should invest in specialized, experiential, hands-on technology to teach real-life skills.

E	HD	S	LS	NA	Mean	Ranked Order
2	3	6	2		3.38	65

7. Schools should incorporate high-tech equipment for administrative duties.

E	HD	S	LS	NA	Mean	Ranked Order
6	6	1			4.38	20

8. Electronic technology, such as voice mail and computer networking should be in future schools.

E	HD	S	LS	NA	Mean	Ranked Order
5	7	1			4.31	29

9. Communication centers should be available to show greater professionalism for teachers.

E	HD	S	LS	NA	Mean	Ranked Order
5	5	3			4.15	39

10. Some mobile, pre-wired, plug-in technology modules and workstations should be evidenced in future classrooms.

E	HD	S	LS	NA	Mean	Ranked Order
1	9	3			3.85	55

(Table Continues)

Table 4 (Continued)

Panel Ratings of Part IV:

Technology Guideline Elements

11. "Smart buildings" with energy efficient, high-tech HVAC systems should be employed in future schools.

E	HD	S	LS	NA	Mean	Ranked Order
6	6	1			4.38	21

12. Future classrooms should have some computer modules linked to the Media center for individualized instruction via learning systems etc.

E	HD	S	LS	NA	Mean	Ranked Order
5	8				4.38	22

13. Flexibility and adaptability to add on new technology are the linchpins in future schools.

E	HD	S	LS	NA	Mean	Ranked Order
7	3	3			4.31	30

14. With high-tech equipment, classrooms must be ergonomically designed.

E	HD	S	LS	NA	Mean	Ranked Order
3	7	2	1		3.92	51

stated: "In a new building, these will not cost very much." A third juror wrote that "This costly flexibility will never see [any] use--Its is more important to provide space or centers for future technology, rather than empty conduits that will probably never be usable."

2. Regarding statement three, which concerns the use of pre-wired labs to facilitate technological growth, one respondent commented: "What if wireless systems evolve?" Even though this statement received high ratings, there seemed to be a concern among the experts that too much money and equipment should not be placed in technological areas that evolve, by educational timelines, very quickly such as a move from fiber optics systems to laser optics communication.

3. Statement six, the investment in specialized, hands-on, experiential technology also elicited one comment from a jurors: "Yes [schools should invest] but in selected centers--Too costly for all buildings."

4. In reference to statement nine, which suggested that telecommunication centers should be available for teachers, one specialist asserted: "These are necessary tools."

5. Statement 14, which contained a suggestion for the use of demountable walls to add greater flexibility, caused several jurors to make the following comments: One specialist stated that "Demountable walls are seldom used."

Another juror echoed this sentiment: "they [demountable walls] usually don't work very well." A third expert who felt that the statement was true, said: "Yes, but this [all items mentioned in the statement] is expensive." A fourth respondent simply stated: "There is obviously much more needed than technology."

Part IV of the questionnaire concerning the use and types of technology to be employed in schools of the future, brought out many thought-provoking responses from the jurors who seemed to be dedicated to the premise of technology but somewhat troubled by the dollars needed to finance it in the schools.

Part V: School and Community Service Areas

Table 5 shows that all five statements in this section received unusual, divergent ratings from the jurors. Two statements were considered to be essential, two were judged highly desirable, and one statement was felt to be significant. Statement one had a high of 4.62, while statement two had the lowest rating of the questionnaire, a 3.15.

The following comments concerning the statements in Part V were considered significant:

1. Regarding statement two, which reflected on the

Table 5

Panel Ratings of Part V: School and Community Service Guideline Elements

1. Whenever possible, schools should attempt to share resources and facilities with the community.

E	HD	S	LS	NA	Mean	Ranked Order
8	5				4.62	7

2. Future schools should reflect the need for daycare and pre- and after-school care for children of both school and community members.

E	HD	S	LS	NA	Mean	Ranked Order
4	4	3		2	3.62	59

3. Schools should serve as an integral community hub for social, medical, family-support, and other services for students and citizens.

E	HD	S	LS	NA	Mean	Ranked Order
2	5	3		3	3.15	66

4. Future schools should be designed as lifelong learning centers for students and community members.

E	HD	S	LS	NA	Mean	Ranked Order
8	4	1			4.54	10

5. Schools should be designed with a two-way openness.

E	HD	S	LS	NA	Mean	Ranked Order
7	4	2			4.38	22

need for increased child care in future school facilities, one juror remarked: "Yes, but the community or state must share the cost."

2. In reference to statement three on the need for schools to serve as a community hub for services, two comments were elicited. One expert wrote that the statement was viable, but he issued this caveat: "Yes--But the financial cost must be covered!" Another juror agreed with the statement, but wrote that there were other alternatives: "Or [the schools] could become better connected to existing facilities."

Summary

A list of 66 statements, considered as guideline elements for planning future public school facilities, was submitted to a jury of specialists for rating and validation. Statements receiving a mean score of 4.5 or better were considered essential. Statements receiving a mean value of 3.5 but less than 4.5 were considered highly desirable. Those statements that were rated at least 3.0 but less than 3.5 were considered significant.

All 66 statements were rated in these three categories: 10 statements were rated as essential; 50 statements were rated as highly desirable; and 6 statements were rated significant. All statements were rank ordered based upon the total weight mean scores. Additionally, two guideline elements suggested by the jury members were added to the final list of elements, and minor word changes were made to several guideline elements.

Chapter 6

Summary, Findings, Conclusions, and Recommendations

Introduction

This chapter includes a summary of the study, the findings of the research based upon the evaluation of the guideline elements by the jury of specialists, conclusions, and the recommendations for further areas of study.

Summary

The purpose of this study was to establish guidelines for planning future public school facilities based upon identified global, societal, and educational trends. It was anticipated that by providing practitioners with a more informed knowledge base upon which to plan, they might use these resources to design more effective future public school facilities. Simply because the sheer amount of technology and informational areas are increasing at laser speed, it becomes even more imperative that school officials broaden their knowledge base and not plan in a vacuum. More than ever before, educational practitioners must examine and become cognizant of global, societal, and educational trends that will possibly have a substantial impact upon the types of public school facilities that will be built in the future. Educational wisdom suggests that the best decisions are those made with the best available resources and information. If these educational planners operate with greater sources of informative data and research, then it is anticipated that they can more closely approximate the disparate and unforseen educational programs, which future public schools must implement in their facilities.

Solution of the problem was achieved through the following subproblems:

Subproblem 1

To trace the historical, philosophical, and architectural development of school facilities, and to identify significant global, societal, and educational trends that might impact upon future public school planning.

The background of the problem and its significance were presented in Chapter 1. Through a review of the literature, the historical, philosophical, and architectural significance of public school buildings was presented in Chapter 2. The purpose of that chapter was to illustrate for the reader the evolutionary historical interrelationship that has existed between the educational philosophies and the school facilities. For almost 2000 years, the educational facilities were constructed for every practical purpose, except the most important one -- to fit the educational program. It seems that educational facility planners have been painfully slow in realizing that schools must do much more than shelter children from inclement weather. For the most part, only in the last quarter century have purposeful facilities been designed and constructed that were base upon the types of programs that must take place within the school buildings. Educational practitioners are now poised on the cutting edge of a new generation of educational facilities that will break the old paradigms and attempt to be responsive to the new curricular programs in innovative ways.

Additionally, Chapter 2 presented and discussed the various global, societal, and educational trends that might possibly impact upon the planning of future public school facilities. Future public school facilities will be heavily influenced by the daily global changes that are happening will lightening speed. Children are now a part of a greater global responsibility that becomes more evident every day with events like the demise of the Berlin Wall, the dissolution of the USSR, and the encroachment of the smoke from the Amazon rain forests. The economy in Japan will most certainly affect our economy, just as the critical need for child care grows with each passing day, as more and more mothers are forced to work, and the divorce rate grows higher. All of these seemingly unrelated changes will impact upon the types of environments and spaces that must be planned for school facilities in the future. Concomitant changes in educational programs will require school facilities to be as malleable and flexible as possible in order to weather the myriad global, societal, and educational changes that are taking place so rapidly.

Subproblem 2

To establish proposed guideline elements for planning future public school facilities.

The identification and establishment of guideline elements related to the planning of future public school facilities was one of the most important phases of the study. Guideline elements were established after a thorough review of the literature, identification of significant global, societal, and educational trends, interviews with authorities in the field, and on-site visitations to 15 school facilities in four states (see Appendix A for on-site interview sheet). The proposed guideline elements were identified for five broad sections: (a) Planning, Design, and Site Selection; (b) Environmental Enhancement Factors; (c) Space Utilization; (d) Technology; and (e) School and Community Service Areas.

Subproblem 3

To validate the guideline elements established in subproblem two.

The guideline elements that were identified for planning future public school facilities were submitted in a questionnaire rating sheet format (see Appendix C for the full questionnaire) to a self-selected jury of experts. This pluralistic, broad-based panel of 13 national jurors consisted of facility planning authorities, architects, educational consultants, superintendents, and educators (see Appendix B for complete list and description of jurors). The questionnaire was pretested by three different facility planning specialists before it was sent to the jury for their validation.

The jurors were asked to evaluate the questionnaire using a numerical Likert scale rated from one to five. The five classifications given for each number were: essential, highly desirable, significant, little significance, and not applicable. Those guidelines that received a mean value of 4.5 or greater were considered essential. Guideline that received a mean value of at least 3.5 but less than 4.5 were considered highly desirable. Any guidelines that received a mean value of 3.0 but less than 3.5 were considered significant. Those guideline elements that received a mean value of less that 3.0 were considered by the investigator to be of little significance or not applicable and not included as guidelines.

A second section of the rating sheet allowed jurors to add any elements that they thought were not adequately covered in the questionnaire. These additional elements and the pertinent comments of the jurors were listed and discussed in Chapter 5.

The study also included three research questions:

1. What are the most pressing need for educational

facilities in the future?

2. As educators, administrators, and concerned citizens what are the goals to seek in designing and implementing future school facilities?

3. What types of global, societal, and educational trends can be identified that will enable educational practitioners to plan more carefully the kinds of facilities that they construct?

Through a review of the literature, interviews with educational facility planners and school administrators, on-site visits to 15 schools in four states, and the validation of 68 guidelines, all three research questions were addressed.

Findings

Based upon the evaluation and validation of the guidelines listed in the questionnaire by the jury of specialists, the findings were reported around the following 68 principles and practices for planning future public school facilities in five sections: (a) Planning, Design, and Site Selection; (b) Environmental Enhancement Factors; (c) Space Utilization; (d) Technology; and (e) School and Community Service Areas.

Part I: Planning, Design, and Site Selection

1. Prior to the selection of a formal planning group, a focus steering committee of "key" individuals, who

establish the parameters of the community's public school needs, e.g., funding mechanisms, should be initiated to begin roundtable discussions concerning future public school plans.

2. One of the first steps in the planning process for future public school facilities should be to establish a pluralistic, broad-based planning and design team composed of teachers, administrators, students, employees, architects, educational planners, parents, school board, and community members who are stakeholders in the school planning process.

3. For the planning and design process to be truly effective, it must place as much information in the hands of as many people as possible to get good feedback, suggestions, and imaginative interaction.

4. Planning should be both bottom-up and top-down.

5. Another initial step, before the planning and design process begins, is to institute a pragmatic and thorough school survey of all the facets of the present educational programs and facilities currently available in the district.

6. If a current survey has not been accomplished, it is often most cost-effective and expedient for a school; district to use the services of a competent, professional educational facility specialist to carry out these services.

7. Long-range, short-range, and strategic plans should be developed that are proactive in nature, rather than reactive, and "knee-jerk" in scope.

8. The school facility plans that are developed must also be based not only upon "hard" statistical data but "soft" data, such as human attitudinal and perceptional information from the end users of the school facilities, such as teachers, administrators, and students, and school employees.

9. Educational programs should be clearly defined and addressed in the educational specifications by the planners before any type of school design is actually drawn up.

10. Flexibility, mobility, and open-ended adaptability should be the cornerstone concepts of any school facility designed for the future.

11. Educational planners should carefully analyze present global, societal, and educational trends and innovations in order to increase the probability that they can more closely approximate the disparate and unforseen educational programs that schools must undertake in the future.

12. Planning teams should be future-oriented and cognizant of the diverse types of spaces needed (quiet areas for individuals and groups; flexible, multi-purpose areas; tailor-made special purpose classrooms or labs) for schools when they enter the design process.

13. One valuable source of planning information should be the collegially-shared building experiences of other educational professionals, who have successfully completed a facility and can suggest ways to avoid pitfalls in the planning/building process.

14. The natural, environmental features of a school site should be considered for the potential contributions that they could make to curriculum areas such as science, and natural landscapes should be preserved to be used as nature trails and environmental teaching tools for students.

15. School sites should be selected with particular attention to those that are free of environmental hazards and restricting easements, have safe convenient access with good availability of transportation systems, have utilities available, are not heavily impacted by adjacent development constraints, and do not conflict with the long-range plans of state and local governing bodies.

16. School/community partnerships of shared land resources, such as adjacent parks or recreation areas, should be planned into the conceptual design of the school.

17. In planning future public school facilities, it should be the planner's responsibility for the final quality control of the facility, including building systems and other components.

Part II: Environmental Enhancement Factors

1. The public school facility should be child-centered and "user-friendly."

2. School designs should be both psychologically and aesthetically pleasing to students, teachers, and parents in myriad ways.

3. The environment of the school facility is designed to offer a place with spaces where both students and teachers can learn, explore, and relate to each other in creative ways and in different size groups.

4. There should be comfortable, noninstitutional, home-like environments within all schools that emphasize a warm, caring attitude towards students and teachers.

5. School facilities should be designed with environments that impart and exhibit a feeling of safety, security, and belongingness for all the individuals involved.

6. Environmental enhancers such as natural lighting sources and visual "vistas" should be used to promote the psychological well-being of students, teachers, and other facility users.

7. Both teachers and students should have some type of individualized spaces (workrooms, lockers, or "cubbies") that can be personalized.

8. The exterior of the school facility should be

aesthetically designed to say "Welcome and Come In" to students, parents, and community members.

9. The immediate visual impression of the entire school facility should be a welcoming one by the creative use of colors, graphics, and decorative textures.

10. School facilities should "fit" into their environment, naturally and comfortably. Whenever possible, they should emulate the surrounding environment and grow consciously from it in a congruent manner.

11. Maximum natural lighting via the judicious use of windows and innovative window treatments, such as clerestories, skylights, and atriums, should be evidenced in school facilities of the future.

12. The highest level of comfort for students, teachers, and other employees should be aspired for through the use of high-tech, well-designed climate controls, acoustics, and lighting systems.

13. The optimal physical comfort of all individuals in the facility should be of the utmost importance in order that efficacious teaching and learning can take place.

<u>Part III: Space Utilization</u>

1. The benchmark concept for designing all future school facilities should be the flexibility of spaces that can encourage experimentation, experiential learning, and different teaching concepts.

2. In general, classrooms should be of an appropriate size to allow for informal settings and non-traditional arrangements of desks or chairs, so as to encourage group collaboration.

3. In many instances, classrooms of the future will have to be larger than usual to carry out the more complex and numerous curricular activities.

4. The Instructional Media Center should be designed to be the central focus of the facility and serve as an informational storage center and a hub for the communication technology.

5. When discrete traditional classrooms are planned, they should be designed to incorporate maximum functional flexibility for the accommodation of future program changes, which are not even known at this time.

6. Movable partitions, demountable or folding walls, and redeployable spaces are viable ways of maximizing the flexibility of spaces in a future school facility.

7. Future classrooms should be designed in ways that will not isolate students or teachers from participation in collaborative learning and teaching.

8. Classroom spaces must be as fluid and malleable as the programs that they serve. Whenever possible, classrooms should be designed to allow free movement of students from one location to another with ease and without obstructions.

9. The individual classroom of the future should be

designed with appropriate high-technology to allow it to function as its own specialized learning center.

10. There should be quiet, private, individual spaces for parents, students, and teachers to conference.

11. Teaching staff should have individualized work areas for planning and preparation in close proximity to their classrooms.

12. Information and resource areas should be tailor-made and larger than usual with special spaces for students to read, work in groups, and conference with teachers, plus additional storage spaces to accommodate expanded amounts of resource materials, information, and communication technology.

13. At appropriate grade levels, there should be multi-purpose laboratories to be used holistically in a variety of curricular programs.

14. There should be numerous individualized and module computer and instructional workstations in each classroom, linked to a central media center to access information.

15. For appropriate age groups, there should be generic, flexible spaces designed to support and accommodate real-life simulations, such as weather stations, television studios, aerospace modules, or mock entrepreneurial businesses.

16. Future school facilities should have special, designated spaces that can be designed specifically for

child care, pre-, and after-school day care of the infants and children of students, teachers, school workers, and community members.

17. There will be a need for specialized, broad-based prototypical lab spaces, tailor-made to support newly designed Instructional Technology programs.

18. There should be special-purpose rooms, designed technologically appropriate and exclusively for curricular areas, such as Band, Art, Theatre, Science, and Music.

19. In future schools, noninstructional space (corridors, cafeterias, commons, etc.) should be designed to become part of the informal learning/social development environments.

Part IV: Technology

1. A technology specialist should be employed by the school system to guide the school in its selection of technology equipment and to train teachers and students in its proper implementation.

2. Future school facilities designs should be as open-ended as possible to allow for future technological growth by the incorporation of larger cable trays and conduit, multiple communication lines (e.g., fiber optics), and extra "clean" power sources for computers, etc.

3. High-technology growth should be facilitated be the judicious use of pre-wired, multi-purpose labs that are

flexible enough to serve divergent programs.

4. Three key areas of technology augmentation should include data and information processing, communication, and video and instructional media.

5. Future schools should be cognizant of the need to network by means of satellite learning and long distance telecommunications technology, as a means of equitably sharing resources and promoting global awareness for students.

6. Whenever possible, schools should examine the possibility of investing in specialized, experiential, hands-on technology used to teach real-life skills in multi-purpose areas such as television and video production studios, radio and weather stations, space mockups, or solar greenhouses

7. Schools should incorporate high-tech record keeping and information gathering equipment for administrative duties.

8. Electronic technology, such as voice mail, and computer and video communication/networking to other schools and geographical areas should be evidenced in schools of the future.

9. Telecommunication centers (telephone, intercom, security) in individual classrooms should be available for all teachers to show greater professionalism.

10. Some mobile, pre-wired, plug-in technology

modules, cubicles, or workstations for individualized and small group instruction should be implemented in most classrooms of the future.

11. "Smart buildings" with energy efficient, high- technology HVAC control systems should be employed in schools of the future.

12. Classrooms of the future should have some computer modules and learning centers linked to a central media center for individualized instruction via computers, ETV, or satellite systems.

13. Flexibility, movability, and open-ended adaptability to add on new technology as needed are the key linchpins to successful schools built for the future.

14. When dealing with high-tech equipment, schools should plan for classrooms that are ergonomically designed with demountable walls, movable visually comfortable light fixtures, and flexibly wired workstations.

Part V: School and Community Service Areas

1. Whenever possible, schools should attempt to find ways to share facilities and resources with their community.

2. Future school facilities should reflect the need for increased daycare, and before- and after-school care of infants and children of students, teachers, employees, and community members.

3. Schools should serve as an integral community hub for medical, social, family-support, and occupational services for students and parents.

4. Schools of the future should be facilities that are designed to serve as lifelong learning centers for both students and community citizens.

5. Future schools should be designed and planned with a new spirit of two-way openness, whereby students will use the community as a learning resource center by using libraries, museums, businesses and citizenry as learning tools, and adults will come into the schools more often for learning services, recreation, and community activities.

Conclusions

As a result of the findings, the following conclusions were drawn concerning specialists attitudes towards the design of future school facilities:

1. Educational facility specialists seem to be strong advocates of the need for all types of school facility planning.

2. Practitioners seem most comfortable with pluralistic, broad-based planning groups that are not too large to be functional.

3. These same specialists also prefer to be proactive planners that rely equally on both "hard and "soft" data to make their planning decisions.

4. It can be concluded that the experts prefer that planning should be both bottom-up and top-down, and as much information as possible should be given to the stakeholders.

5. Planners seem to be committed to school designs that are child- or student-centered and "user-friendly."

6. Almost all facility experts are concerned that schools be designed to be both aesthetically and psychologically pleasing to all.

8. Specialists rate the selection of an optimal school site as a very high priority item.

9. School facilities planners also concurr that the highest level of comfort for facility inhabitants should be aspired for through the use of high-tech systems.

10. Educational specialists are in agreement that school environments should be spaces where students and teachers can learn, explore, and relate.

11. There is also agreement that future school designs must include maximum flexibility, including spaces for group collaboration and quiet, private spaces for conferencing.

12. It can be concluded that educational specialists prefer to design schools that are able to share resources and facilities with the community.

14. Future schools should also be designed as lifelong learning centers both students and community members.

Recommendations

The results of this study were used in the development of guidelines for planning future public school facilities. Based upon those findings, the following recommendations were made:

1. Future research could be conducted to determine the impact of the aesthetic environment in public school facilities upon the attitudes and learning abilities of students.

2. Educational planners should spend more time in the schools observing and talking with students in an attempt to design facilities that are truly student-centered and serve all their needs.

3. Schools and communities should explore the possibilities of greater use of synergistically shared facilities, parks and recreation areas, and learning resources.

4. There should be further studies and research on creating greater flexibility of spaces in school facilities.

5. It could be beneficial to initiate additional research in the relationships between real-life experiential programs in schools and students' satisfaction with learning.

6. Graphics should be used more extensively in the school designs as an inexpensive but valuable learning tool for students.

7. Educational planners should closely scrutinize the educational specifications for elementary schools to insure that all equipment and furniture, including doors, sinks, counter tops, water fountains, cubbies, and window sills, are user-friendly and easily accessible for children.

8. Further research needs to be undertaken on ways in which greater space utilization can be achieved by teachers in their present classroom area through the use of flexible, functional furniture and equipment.

9. Additional studies should be undertaken on teachers' attitudes towards natural lighting and the role that it plays in students' and teachers' psychological well-being.

10. School designers should become more cognizant of the innovative aesthetic color treatments and designs used in commercial businesses such as McDonald's, and perhaps apply this "fun atmosphere" to school cafeterias, etc.

REFERENCES

REFERENCES

Adkins, G. (1989). Megatrends author foresees the millennium. Educational Leadership, 46(6), 16-17.

Affleck, K., & Fuller, B. (1988). The integration of programming and educational specifications. CEFP Journal, 26(6), 9-12

Alley, R. (189). A futurist view: Forces framing the future of teacher education programs. In J. A. Braun, Jr., (Ed.), Reforming teacher education: Issues and new directions (pp. 117-157). New York: Garland.

Amara, R. (1990). The second decade. Menlo Park, CA: Institute for the Future.

Ancell, A., & Haugen, M. (1986). Here's how we sut up a staff-run day-care center for our own kids. The American School Board Journal, 173(6), 35-36.

Apple, M. W. (1983). Curriculum in the Year 2000: Tensions and possibilities. Phi Delta Kappan, 64, 321-326.

Babineau, R. E. (1991). Restructuring education--Restructuring facilities. Educational Facility Planner, 29(1), 5-12.

Benjamin, J. S. (1987). The future isn't what it used to be: A content analysis of the educational futures and educational reform report literatures with recommendations for public school policy. (Doctoral dissertation, Indiana University, Bloomington, 1987).

Benjamin, J. S. (1989). An ideascape for education: What futurists recommend. Educational Leadership, 47(1), 8-14.

Berstein, A. (1988, September 19). Where the jobs are is where skills aren't. Business Week, pp. 104-106.

Bingler, S. (1990). Concordia/MIT symposium on education. Educational Facility Planner, 28(1), 19.

Blackston, J. W. (1967). Guidelines fo planning food service facilities (Doctoral dissertation, University of Tennessee, Knoxville, 1967). Dissertation Abstracts International, 27, 2762.

Bleke, B. R. (1988). When California dreamin' design turns nightmarish, renovation saves the day. The American School Board Journal, 175(6), 35-37.

Borg, W. D., & Gall, M. D. (1989). Educational research: An introduction (5th ed.). New York: Longman.

Bowers, B., & Hamons, S. D. (1990). Building gym builds community support. The American School Board Journal, 177(5), 38-39.

Bowers, J. H. (1968). A study of spaces for physical education (Doctoral dissertation, University of Tennessee, Knoxville, 1967). Dissertation Abstracts International, 28, 2085.

Bowers, J. H. (1989, August). Forecasting the future for school facilities. Paper presented at the meeting of the National Council of Professors of Educational Administration, Tuscaloosa, AL.

Bowers, J. H., & Burkett, C. W. (1989). Effects of physical environment on students and faculty. Educational Facility Planner, 27(1), 28-29.

Brooks, K. W., Conrad, M. C., & Griffith, W. (1980). From program to educational facilities. Lexington, KY: Center for Professional Development.

Brubaker, C. W. (1988a). These 21 trends will shape the future of school design. The American School Board Journal, 175(4), 31-33, 66.

Brubaker, C. W. (1988ba). Planning tomorrow's schools: Eight trends to shape school designs. CEFP Journal, 26(6), 4-6.

Brubaker, C. W. (1990). Education and architecture: Does Good design enhance the learning process? Wingspan: The Pedamorphosis Communique, 6(1), 14-15.

Brubaker, C. W. (1991). Lessons in high school planning and design. School Business Affairs, 57(1), 6-10.

Castaldi, B. (1987). Educational facilities: Planning, modernization, and management. Newton, MA: Allyn & Bacon.

Cawelti, G. (1989). Designing high schools for the future. Educational Leadership, 47(1), 30-35.

Cetron's latest forecasts of education's critical needs. The School Administrator, 1990, January, 29-31.

Chan, T. C. (1988). The aesthetic environment and student learning. School-Business-Affairs, 54(1), 26-27.

Christopher, G. (1990). Form follows function. Thrust for Educational Leadership, 39(1), 32-36.

Christopher, G. (1991). Effect of architecture on education. Educational Facility Planner, 29(1), 10-12.

Coates, J. F., & Jarratt, J. (1990). What futurist believe: Agreements and disagreements. The Futurist, 24(6), 22-27.

Coleman, D. G. (1989). Future facility forecasting. Educational Facility Planner, 27(5), 4-8.

Conners, D. A. (1983). The school environment: A Link to understanding stress. Theory Into Practice, 22(1), 15, 20.

Council of Educational Facility Planners (1969). Guide for planning educational facilities. Columbus, OH: Author.

Council of Educational Facility Planners, International (1985). Guide for planning educational facilities. Columbus, OH: Author.

Council of Educational Facility Planners, International (1991). Guide for planning educational facilities. Columbus, OH: Author.

Crabbe, A. B. (1989). The future problem solving program. Educational Leadership, 47(1), 27-29.

Day, C. W. (1985). Conflicts: Owners vs. architects. _CEFP Journal_, _23_(6), 4-5.

Day, C. W., & Herlihy, J. J. (1989). What makes a computer lab smart? _The School Administrator_, _51_(7), 20-23.

Dede, C. (1989). The evolution of information technology: Implications for curriculum. _Educational Leadership_, _47_(1), 23-26.

DiGeronimo, J., & Gustafson, G. A. (1986). Our day-care plan pays for itself, keeps enrollments up, and pleases busy parents. _The American School Board Journal_, _173_(1), 30-31.

Earthman, G. I. (1985). Evaluating the completed project. _CEFP Journal_, _23_(3), 5-6.

Earthman, G. I. (1987). A window on the future at the annual meeting. _CEFP Journal_, _25_(2), pp. 18-20.Education

Educational Facilities Laboratories (1972). _Environmental education/facility resources_. New York: Author.

Educational Facilities Laboratories (1973, November). _Community/School: Sharing the space and the action_. New York: Author.

Education Writers Association (1989). _Wolves at the schoolhouse door: An investigation of the condition of public school buildings_. Washington, DC.

Engelhardt, D. F. (1984). The roles of the facility planner in controlling costs of educational facilities. _CEFP Journal_, _22_(6), 18-21.

Ficklen, E. (1988a). Together, school and city planners devised this versatile school-in-a-park. The American School Board Journal, 175(10), 34-35.

Ficklen, E. (1988b). This hi-tech high school brings the 21st century to Orlando a little early. The American School Board Journal, 175(4), 34-36.

Ficklen, E. (1988c). A school to match the mountains takes regional architecture to new heights. The American School Board Journal, 175(8), 30-32.

Frohreich, L. E. (1986). Inservicing teachers and administrators on classroom environment. CEFP Journal, 24(2), 10-13.

Fulghum, R. (1990). A bag of possibles and other matters of the mind. Newsweek, pp. 88-92.

Gardner, D. E. (1986). Dwayne E. Gardener: A professional profile. CEFP Journal, 24(2), 4-7.

Gardner, D. E. (1987). School buildings of the future. CEFP Journal, 25(2), 24-27, 36.

Gay, L. R. (1987). Educational research: Competencies for analysis and application (3rd ed.). Columbus,OH: Merrill.

Gianakopoulos, G. (1989). Sophistication and safety codes are vital. American School & University, 61(11), 17-22.

Glassner, B., & Corzine, J. (1982). Library research as fieldwork: A startegy for content analysis. Sociology and Social Research, 66(3), 305-319.

Goldberg, B. (1990). Restructuring Schools: Architecture and restructuring. Radius, 3 (1), 1-14.

Graves, B. E. (1989). Furnishings. American School & University, 61(5), 19.

Hathaway, W. E., & Fiedler, D. R. (1987). A window on the future: A View of education and educational facilities. CEFP Journal, 25(2), 4-17.

Heller, S., & Turner, J. A. (1988). This hands-on learning center keeps kids in touch with science. The American School Board Journal, 175(8), 26-27, 38.

Herlihy, J. J., & Day, C. W. (1989). With corporate help, we're building the school of the future now. The American School Board Journal, 176(3), 39-40.

Hill, R. (1984). School architecture: New activities dictate new designs. CEFP Journal, 22,(2), 4-5.

Hodgkinson, H. (1991). Reform versus reality. Phi Delta Kappan, 73, 9-16.

Hoang, D. L. (1984). Expandable-contractable core schools. CEFP Journal, 22(2), 22-24.

Hoy, W. K., & Miskel, C. G. (1991). Educational administration: Theory, research, and practice (4th ed.). New York: McGraw-Hill.

Hunter, E. (1990a). A vision of the future: Cooperation and courage. NASSP Bulletin, 74(522), 6-11.

Hunter, E. (1990b). Looking toward the 1990s--A decade of change. NASSP Bulletin, 75(528), 99-107.

Kagan, S. L. (1989). Early child care and education: Tackling the tough issues. Phi Delta Kappan, 71, 433-439.

Kaiser, H. H., (Ed.). (1980). Managing facilities more effectively. New Directions for Higher Education, 30.

Kaywell, J. F., & Carroll, R. G. (1988). Education in the year 2000: Possible and preferable futures. Clearinghouse, 62(1), 11-13.

Keller, M. A. (1986). Interior design's role in educational specifications. CEFP Journal, 24(1), 19-21.

Kindley, M. M. (1985). Little schools on the prairie still teach a big lesson. Smithsonian, 16 (7), 118-29.

Knezevich, S. J. (1984). Administration of public education (4th ed.). New York: Harper & Row.

Lewis, J. J. Jr., (1983). Long-range and short-range planning for educational administrators. Boston: Allyn & Bacon.

Levinson, E. (1990). Will technology transform education or will the schools co-opt technology? Phi Delta Kappan, 72, 121-126.

McElrath, R. L. (1969). A study of Instructional closed-circuit television systems (Doctoral dissertation, University of Tennessee, Knoxville, 1968). Dissertation Abstracts International, 29, 2067.

McInerney, W. D. (1985). Potential Impacts of educational futures on educational facilities. CEFP Journal, 25(6), 25-26.

Mecklenberger, J. A. (1988). Bold pacesetters are transforming their schools for new times. The American School Board Journal, 175(9), A6.

Miller, M. L. (1991). School library media professionals: Working for the information age. NASSP Bulletin, 75(535), 43-48.

Musegades, P. (1986). How schools lead the way in one state's high-tech transformation. The American School Board Journal, 173(1), 36-37.

Naisbitt, J. (1982). Megatrends. New York: Warner Books.

National Commision on Excellence in Education (1983, April). A nation at risk. Washington, DC: U.s. Department of Education.

The new lexicon Webster's dictionary of the English language (1989). New York: New Lexicon Publications.

Newman, H. S. (1988). Behavioral Design. American School & University, 61(1), 33-36.

Office of Education (1969). Standard terminology for curriculum and instruction for local and state school systems. Washington, DC: U.S. Government Printing Office.

Office of Education & Educational Facilities Laboratories (1970). Places and things for experimental schools. Washington, DC: U.S. Government Printing Office.

Ohio high school renews HVAC plant (1989). American School & University, 61(6), 85.

Ornstein, A. C. (1990). School finance in the '90s. The American School Board Journal, 177(1), 36-39.

Our one-size-fits-all public schools.... (1989). The American School Board Journal, 176(7), p. 27.

Ozmon, H. A., & Craver, S. M. (1986). Philosophical foundations of education (3rd ed.). Columbus, OH: Merrill.

Pearson, C. A. (1991, January). Making the grade. Architectural Digest, 91-93.

Pesanelli, D. (1990). Education takes to the streets. The Futurist, 24(2), 29-33.

Phillips, J. B. (1986). Updated classrooms for updated curriculum. CEFP Journal, 24(2), 8-9.

Piccigallo, P. R. (1989). Renovating urban schools is fundamental to improving them. Phi Delta Kappan, 70, 402-406.

Pounds, R. L., & Bryner, J. R. (1967). The school in American society (2nd ed.). New York: Macmillan.

Pulliam, J. D. (1987). History of education in America (4th ed.). Columbus, OH: Merrill.

Quest, J. (1989). Tech center: Flexibility is the key. American School & University, 61(11), 25-27.

Raebeck, B. S. (1990). Transformation of a middle school. Educational Leadership, 47(7), 18-21.

Ravitch, D. (1983). On thinking about the future. Phi Delta Kappan, 64, 317-320.

Reeser, M. (1988a). When enrollments bulge but budgets don't, consider 'satellite learning centers.' The American School Board Journal, 175(6), 32-33.

Reeser, M. (1988a). Too skittish to build new schools? Try flexible facilities. The American School Board Journal, 175(6), 34.

Reeser, M. (1988b). When students say school makes them sick, sometimes they're right. The American School Board Journal, 175(8), 17-21.

Research Corporation of the Association of School Business Officials of the United States and Canada (1980). Schoolhouse planning. Park Ridge, Il: Author.

Rist, M. C. (1989a). High tech and smart construction distinguish this Maryland high school. The American School Board Journal, 176(2), 32-33.

Rist, M. C. (1989b). Times change, but this ten-year-old school plan remains fresh and functional. The American School Board Journal, 176(4), 42-43, 48.

Rist, M. C. (1989c). Kids feel at home in this school's relaxed, shopping-mall atmosphere. The American School Board Journal, 176(8), 32-33.

Rist, M. C. (1990). Color this school inviting and effective. The American School Board Journal, 177(8), 32-33.

Ritterspacher P., & Hill, F. (1990). Students benefit from home-based design. American School & University, 62(7), 21-22.

Rubin, L. J., & Bogers, S. B (1991). The changing family: Implications for education. Principal, 71(1), 11-13.

Rydeen, J. E. (1989). Elementary school design. The American School Board Journal, 175(6), A13-A15.

Shane, H. G. (1989). educated foresight for the 1990s. Educational Leadership, 47(1), 4-6.

Shane, H. G. (1990). Improving education for the twenty-first century. Educational Horizons, 36(1), 11-15.

Shedlin, A., Jr., (1990). Shelter from the storm. The American School Board Journal, 177(9), 12-16.

Simpson, W. F. III, & Doland, S. M. (1989). Footsteps away: School-based child care for staff. Principal, 69(2), 53.

Snyder, T. D. (1988). Trends in education. Principal, 67 (1), 26-31.

Snyder, T. D. (1990). Trends in education. Principal, 69 (1), 6-8.

Stetson, E. (1991). The big green schoolhouse. Educational Leadership, 48(4), 34-35.

Stevenson, W. A. (1987). Creating a high school for the 21st century. CEFP Journal, 25(5), 4-6.

Stover, D. (1987). Modular classrooms look good and last as long as units a third more expensive. The American School Board Journal, 174(9), 42-43.

Toffler, A. (Ed.). 1974. Learning for tomorrow: The role of the future in education. New York: Random House.

Toffler, A. (1980). The third wave. New York: Bantam Books.

Toffler, A. (1981). Education and the future. Social Education, 45, 422-426.

Too skittish to build new schools? Try flexible facilities. (1988). The American School Board Journal, 176(6), 34.

Vasilakis, J. N. (1990). Are your schools ready for the 21st century? School Business Affairs, 49(1), 26-29.

Watson, T. H. (1981, Nov.-Dec.). Corncrib schooling. American Heritage, 30-31.

Weinstein, S., & Roschwalb, S. A. (1990). Is there a role for educators in telecommunications policy? Phi Delta Kappan, 72, 115-117.

Williams, R. D. (1990). California's 'schools for the 21st century.' Educational Facility Planner, 28(1), 20.

Wolfe, M. (1970). The educational park: A guide to its implementation. New York: Center for Urban Education.

Zigler, E., & Ennis, P. (1988). Child care: A new role for tomorrow's schools. Principal, 68(1), 10-13.

APPENDICES

APPENDIX A

INTERVIEW GUIDE:
GUIDELINES FOR PLANNING FUTURE PUBLIC SCHOOL FACILITIES

Name of the School ____________________________________

Position of Individual Interviewed_____________________

Date Visited__________________

1. What do you feel was the most successful key ingredient in planning this school project?

2. Could you describe the make-up of the design team for this school?

3. What is your personal opinion about the optimal size of public schools (number of students)?
   Primary/Elementary
   Secondary/Middle
   High School

4. Was there any information available from state agencies to guide you in the planning of this facility?

5. What particular behavioral, psychological, and aesthetic considerations were planned for this particular facility and why?

6. How will the design features of this facility influence the implementation of new and innovative curricula?

7. Was there any consideration given to regional architecture or climate-based planning in this particular facility?

8. In the initial design of the facility, what kinds of unusual spaces were requested and by whom?

9. What do you feel was the most practical source of help for you as a principal in going through the building process?

10. Where certain technological innovations planned for this particular facility and how was it designed to meet these demands?

11. What types of support services for students and community groups are evidenced in this design?

12. What consideration was given to energy and environmental concerns in planning this facility?

13. In planning this school, what considerations were given to the flexibility, adaptability, and re-use of its spaces?

14. What do you consider to be the best planning feature of this school and why?

15. Could you pinpoint the area of this facility that you would plan and execute differently, if given the chance?

16. Aside from monetary considerations, what was the most influential force that determined the ultimate design of this facility?

17. Were efforts made to use any physical portions of the building as learning tools for students?

APPENDIX B

APPENDIX B

MEMBERS OF THE JURY

Mr. David Boddy

Mr. Boddy currently serves as Director of Facilities for the Virginia Department of Education. He has also served as a school facility planning consultant throughout the United States.

Mr. C. William Brubaker

Mr. Brubaker is the Vice President of the Perkins & Will Architects in Chicago, Illinois. He is a seminal architect whose work on public school facilities can be seen throughout the United States. He is a prolific writer and has served as a past President of the Council of Educational Facility Planners, International. Mr. Brubaker is known and respected by his colleagues for his insightful ideas and innovative architectural solutions to public school planning.

Dr. Leonard Skov

Dr. Skov is Dean of the College of Education at the University of Nebraska - Kearney. He is a member and past President of the Council of Facility Planners, International. Dr. Skov is firmly committed to the importance of quality public school facilities and their significance in the educational process of our nation's students. He is especially interested in the relationship between the school curriculum and the facility.

Dr. Bill M. Wise

Dr. Wise is currently Assistant Superintendent for Metropolitan Nashville - Davidson County Public Schools. He is a graduate of the University of Tennessee School Planning Laboratory and has served in various capacities as a consultant in 10 states, a university professor, and an educational administrator. In his current position, Dr. Wise has managed the programming, design, and construction of over 35 school and support buildings totalling $285 million.

Dr. Roy M. Blizzard, Jr.

Dr. Blizzard is Director of Planning and Operations for Buncombe County Public Schools in Asheville, North Carolina. He is well-known throughout the southern region for his facility planning expertise in the public schools.

Dr. M. Gene Coffey

Dr. Coffey is currently Director of Educational Facilities Programming at Winsor/Faricy Architects, Inc. in St. Paul, Minnesota. He has also held positions as Director of school facilities for several large metropolitan school districts, and his well-rounded expertise as a facility planner is acknowledged throughout the Northern United States.

Dr. Tom Morgan

Dr. Morgan is a professor in the department of Educational Leadership at Auburn University. He has an excellent background in public school facility planning and has served as a consultant throughout the United States.

Dr. Robert D. Williams

Dr. Williams is a graduate of the Stanford University School Planning Laboratory and a former consultant for the School Facilities Planning Division, California Department of Education. He has authored several articles and monographs on facility master planning, and he was one of the designers of the "California's Schools for the 21st Century" document.

Dr. Beth Herbert

Dr. Herbert is the principal of the Crow Island School in Winnetka, Illinois. Crow Island School is widely regarded as the most influential school building in America and recently was designated a national landmark. Dr. Herbert has hosted several conferences celebrating the unique diversity of this facility, and she has gained national recognition for her leadership and knowledge of the issues that make a seminal public school facility.

Mr. Steven B. Bingler

Mr. Bingler is President of Concordia Architects in New Orleans, Louisiana. His firm has won 17 national and regional awards for design excellence, and he is a recognized professional advocate for the importance of quality, innovative public school designs. He is a national speaker and author who has also created the nonprofit "Association for the Collaborative Arts" to provide funding for education and research in participatory creative processes.

Mr. Anthony J. Moore

Mr. Moore is an architect in Kingsport, Tennessee who has just recently finished work on several innovative public school renovation projects in that city. His design for the Andrew Johnson Elementary School received the Tennessee School Board Association's 1990 award for the Tennessee School of the Year. Mr. Moore is an imaginative architect that takes great pride in his ability to design schools that are child-centered and fun to be in.

Mr. Jerry Knott

Mr. Knott is a consulting architect in the School Planning Section of the North Carolina Department of Instruction. He is an integral part of the Chief Consultant's School Facilities Planning office which oversees all new school facilities planned and built in North Carolina.

Dr. Charles Tollett

Dr. Tollett is presently the Superintendent of the Kingsport, Tennessee city schools. He was instrumental in the innovative visionary schools that have been implemented in that city, as a part of a $40 million school facilities project. He is widely regarded as a very futuristic educator and has been a featured speaker at several of the Council of Educational Facility Planners, International conferences.

APPENDIX C

FACILITY QUESTIONNAIRE

Purpose of the Questionnaire

The purpose of this questionnaire is to assess those elements considered **essential, highly desirable,** and **significant** in planning future public school facilities. Each guideline item describes a specific guideline element for planning a public school facility. This research project does not attempt to be definitive or exhaustive in nature, therefore the guideline elements listed in this questionnaire are merely designed to allow the educational practitioner some valuable insights into school facility planning, which may be used as a stepping stone for further study in certain critical areas. It is anticipated that these planning guidelines will inspire interested parties to delve even deeper into the research literature for answers to specific questions.

Directions

1. Please **READ** each item on the questionnaire thoroughly and carefully.
2. Please **ANSWER** each item on the questionnaire.

3. **DETERMINE** if the guideline element for planning future public school facilities is: (5) **Essential,** (4) **Highly Desirable,** (3) **Significant,** (2) of **Little Importance,** or (1) **Not Applicable.**

Code	Guideline Rating	Explanation
5	**Essential**	An element necessary in planning future public school facilities.
4	**Highly Desirable**	An element that is not absolutely necessary but would be of functional value in planning future public school facilities.
3	**Significant**	An element not necessary but would have some functional value in planning future public school facilities.
2	**Little Significance**	An element holding little value even though its presence would not harm the planning process.
1	**Not Applicable**	An element which would have no value in planning future public school facilities.

Please **CIRCLE** one appropriate arabic numeral rating code listed below each guideline element.

FACILITY QUESTIONNAIRE

Part I: Planning, Design, and Site Selection

Guideline Elements

1. Prior to the selection of a formal planning group, a focus group of "key" individuals, who establish the parameters of the community's public school needs, e.g., funding mechanisms etc., should be initiated to begin roundtable discussions concerning future public schools plans.

   5 4 3 2 1

2. One of the first steps in the planning process for future school facilities should be to establish a pluralistic, broad-based planning and design team composed of teachers, administrators, students, employees, architects, educational planners, parents, board and community members who are stakeholders.

   5 4 3 2 1

3. For the planning and design process to be truly effective, it must place as much information in the hands of as many people as possible to get good feedback, suggestions, and imaginative interaction.

   5 4 3 2 1

4. Planning should be bottom-up, not top-down.

   5 4 3 2 1

5. Another initial step, before the planning and design process begins, is to institute a pragmatic and thorough school survey of all facets of the present educational programs and facilities currently available in the school district.

   5 4 3 2 1

6. If a current school survey has not been accomplished, it is often most cost-effective and expedient for a school district to utilize the services of a competent, professional educational facility planner to carry out these services.

   5 4 3 2 1

7. Long-range, short-range, and strategic school facility plans should be developed that are proactive in nature, rather than reactive and "knee-jerk" in scope.

5 4 3 2 1

8. The school facility plans that are developed must also be based not only upon "hard" statistical data but "soft" data, such as human attitudinal and perceptional information from the end users of the school facilities, such as teachers, administrators, students, and school employees.

5 4 3 2 1

9. Educational programs should be clearly defined and addressed in the educational specifications by the planners before any type of school design is actually drawn up.

5 4 3 2 1

10. Flexibility, mobility, and adaptability should be the cornerstone concepts of any school facility designed for the future.

5 4 3 2 1

11. Educational planners should carefully analyze present global, societal, and educational trends and innovations in order to increase the probability that they can more closely approximate the disparate and unforseen educational programs that schools must undertake now and in the future.

5 4 3 2 1

12. Planning teams should be future-oriented and cognizant of the diverse types of spaces needed (quiet areas for individuals or groups; flexible, multi-purpose areas; tailor-made, special purpose classrooms or labs) for schools when they enter the design process.

5 4 3 2 1

13. One valuable source of planning information should be the collegially-shared building experiences of other educational professionals, who have successfully completed a facility and can suggest ways to avoid pitfalls in the planning/building process.

5 4 3 2 1

14. The natural, environmental features of a school site should be considered for the potential contributions that they could make to curriculum areas such as science, and whenever possible natural landscapes should be preserved to be used as nature trails and environmental teaching tools for students.

    5 4 3 2 1

15. School sites should be selected with particular attention to those that are free of environmental hazards and restricting easements, have safe access with good availability of transportation systems, have utilities available, are not heavily impacted by adjacent development constraints, and do not conflict with long-range plans of state and local governing bodies.

    5 4 3 2 1

16. School/community partnerships of shared land resources, such as adjacent parks or recreation areas, should be planned into the conceptual design of the school.

    5 4 3 2 1

Part II: Environmental Factors: Aesthetic, Psychological, and Behavioral Guideline Elements

1. The public school facility should be child-centered and "user-friendly."

   5 4 3 2 1

2. School designs should be both psychologically and aesthetically pleasing to students, teachers, administrators, and parents in myriad ways.

   5 4 3 2 1

3. The environment of the school facility is designed to offer a place with spaces where both students and teachers can learn, explore, and relate to each other in creative ways and in different size groups.

   5 4 3 2 1

4. There should be comfortable, noninstitutional, home-like environments within schools that emphasize a warm, caring attitude towards students and teachers.

   5 4 3 2 1

5. School facilities should be designed with environments that impart a feeling of safety, security, and belongingness for all the individuals involved.

   5 4 3 2 1

6. Environmental enhancers such as natural light sources and visual "vistas" should be used to promote the psychological well-being of students, teachers, and other facility users.

   5 4 3 2 1

7. Both teachers and students should have some type of individualized spaces (workrooms, lockers, or "cubbies") that can be personalized.

   5 4 3 2 1

8. The exterior of the school facility should be aesthetically designed to say "Welcome and Come In" to students, parents, and community members.

   5 4 3 2 1

9. The immediate visual impression of the entire school facility should be a welcoming one by the creative use of colors, graphics, and decorative textures.

   5 4 3 2 1

10. School facilities should "fit" into their environment, naturally and comfortably. Whenever possible, they should emulate the environment and grow consciously from it in a congruent manner.

    5 4 3 2 1

11. Maximum natural lighting via the judicious use of windows and innovative window treatments, such as clerestories, skylights, and atriums, should be a requisite standard in school facilities of the future.

    5 4 3 2 1

12. The highest level of comfort for students, teachers, other school employees should be aspired for through the use of high-tech, well-designed climate control, acoustics, and lighting systems.

5 4 3 2 1

13. The optimal physical comfort of all individuals in the facility should be of the utmost importance in order that efficacious teaching and learning can take place.

5 4 3 2 1

Part III: Space utilization Guideline Elements

1. The benchmark concept for designing all future public school facilities should be the flexibility of the spaces, which can encourage experimentation, experiential learning, and different teaching concepts.

5 4 3 2 1

2. In general, classrooms should be of an appropriate size to allow for informal settings and non-traditional arrangements of desks or chairs, so as to encourage group collaboration.

5 4 3 2 1

3. In many instances, classrooms of the future will have to be larger than usual in order to properly carry out the more complex and numerous curricular programs.

5 4 3 2 1

4. The Instructional Media Center should be designed to be the central focus of the facility and serve as an informational storage center and a hub for communication technology.

5 4 3 2 1

5. When discrete traditional classrooms are planned, they should be designed to incorporate maximum functional flexibility for the accommodation of future programmatic changes, which are not even known at this time.

5 4 3 2 1

6. Movable partitions, demountable or folding walls, and redeployable spaces are viable ways of maximizing the flexibility of spaces in a future school facility.

   5 4 3 2 1

7. Future classrooms should be designed in ways which will not isolate students or teachers from participation in collaborative learning or teaching.

   5 4 3 2 1

8. Classroom spaces must be as fluid and malleable as the programs that they serve. Whenever possible, classrooms should be designed to allow the free movement of students from one location to another with ease and without obstructions.

   5 4 3 2 1

9. The individual classroom of the future should be designed with appropriate high-technology to allow it to function as its own specialized learning center.

   5 4 3 2 1

10. There should be quiet, private, individual spaces for parents, students, and teachers to conference.

    5 4 3 2 1

11. Teaching staff should have individualized work areas for planning and preparation in close proximity to their classrooms.

    5 4 3 2 1

12. Information and resource areas should be tailor-made and larger than usual with special spaces for students to read, work in groups, and conference with teachers, plus additional storage spaces to accommodate instructional and communication technology materials.

    5 4 3 2 1

13. At appropriate grade levels, there should be multi-purpose laboratories to be used holistically in a variety of curricular programs.

    5 4 3 2 1

14. Depending on the grade level, there should be myriad individualized and module computer and instructional workstations in each classroom, linked to a central media center to access information.

    5 4 3 2 1

15. For appropriate age groups, there should be generic, flexible spaces designed to support and accommodate real-life simulations, such as weather stations, television studios, aerospace modules, or mock entrepreneurial businesses.

    5 4 3 2 1

16. Future public school facilities should have special, designated spaces that can be designed specifically for child care and pre- and after-school day care of the infants and children of students, teachers, school workers, and community members.

    5 4 3 2 1

17. There will be a need for specialized, broad-based prototypical lab spaces, tailor-made to support newly designed Instructional Technology programs.

    5 4 3 2 1

18. There should be special-purpose rooms designed technologically appropriately and exclusively for curricular areas, such as Band, Art, Theatre, Science, and Music.

    5 4 3 2 1

Part IV: Technology Guideline Elements

1. A technology specialist should be employed by the school system to guide the school in its selection of technology equipment and to train teachers and students in its proper implementation.

    5 4 3 2 1

2. School facilities designs should be as open-ended as possible to allow for future technological growth by the incorporation of larger cable trays and conduit, multiple communication lines (e.g., fiber optics), and extra "clean" power sources for computers etc.

    5 4 3 2 1

3. High-technology growth should be facilitated by the judicious use of pre-wired, multi-purpose labs that are flexible enough to serve divergent programs.

   5 4 3 2 1

4. Three key areas of technology augmentation should include data and information processing, communication, and video and instructional media.

   5 4 3 2 1

5. Future schools should be cognizant of the need to network by means of satellite learning and long distance telecommunications technology, as a means of equitably sharing resources and promoting global awareness for students.

   5 4 3 2 1

6. Whenever possible, schools should examine the possibility of investing in specialized, experiential, hands-on technology utilized to teach real-life skills in multi-purpose areas, such as television and video production studios, radio and weather stations, space mockups, or solar greenhouses.

   5 4 3 2 1

7. Schools should incorporate high-tech record keeping and information gathering equipment for administrative duties.

   5 4 3 2 1

8. Electronic technology, such as voice mail, and computer and video communication/networking to other schools and geographical areas should be evidenced in schools of the future.

   5 4 3 2 1

9. Telecommunication centers (telephone, intercom, security etc.) in individual classrooms should be available to show greater professionalism for all teachers.

   5 4 3 2 1

10. Some mobile, pre-wired, plug-in technology modules, cubicles, or workstations for individual and small group instruction should be implemented in most classrooms of the future.

    5 4 3 2 1

11. "Smart buildings" with energy efficient, high-technology HVAC control systems should be employed in schools of the future.

    5 4 3 2 1

12. Classrooms in future schools should have some computer modules and learning centers linked to a central media center for individualized instruction via the computer, ETV, or satellite systems.

    5 4 3 2 1

13. Flexibility, movability, and open-ended adaptability to add on new technology as needed are the key linchpins in schools built for the future.

    5 4 3 2 1

14. When dealing with high-tech equipment, schools should plan for classrooms that are ergonomically designed with demountable walls, movable visually comfortable light fixtures, and flexibly wired workstations.

    5 4 3 2 1

Part V: <u>School and Community Service Areas</u>

<u>Guideline Elements</u>

1. Whenever possible, schools should attempt to find ways to share resources and facilities with their community.

   5 4 3 2 1

2. Future school facilities should reflect the need for increased daycare, and before- and after-school care of infants and children of students, teachers, employees, and community members.

   5 4 3 2 1

3. Schools should serve as an integral community hub for medical, social, family-support, and occupational services for students and parents.

   5 4 3 2 1

4. Schools of the future should be facilities that are designed to serve as lifelong learning centers for both students and community citizens.

   5 4 3 2 1

5. Future schools should be designed and planned with a new spirit of two-way openness, whereby students will use the community as a learning resource center by utilizing libraries, museums, businesses and citizenry as tools for learning, and adults will come into the schools more often for learning services, recreation, and community activities.

   5 4 3 2 1

Note to the Panel of Specialists:

If you wish to add additional elements that you feel I may not have included, please list and rate them below. Also please feel free to list any comments or suggestions beside appropriate elements in the body of the rating sheet. After completing this questionnaire, please return it as soon as possible in the enclosed self-addressed, stamped envelope.

Additional Elements or Suggestions:

1.

2.

3.

4.

Name of the Panel Member:______________________________

Job Position or Title:__________________________________

Would you please include a brief work bibliography and list of professional accomplishments?

For your benefit, no names or identities will be used in the data derived from this questionnaire. **Thank You** for your time and participation in this research project.

APPENDIX D

Appendix D

Respondent Ratings to Individual Guideline Elements

Part I: Planning, Design, and Site Selection

Q1.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	4	5	4	4	4	5	5	3	5	4	4
Q2.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	5	5	4	5	5	5	5	4	3	4
Q3.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	4	5	4	4	5	5	4	5	3	4
Q4.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	3	5	5	5	4	5	4	5	4	4
Q5.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	4	5	5	5	4	5	4	4	5	2	3
Q6.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	3	5	5	5	4	4	3	4	3	3	4
Q7.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	5	5	5	4	5	5	3	4	3	5
Q8.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	5	5	5	4	5	5	5	5	5	5
Q9.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	5	5	5	5	5	3	4	5	4	5
Q10.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	3	3	5	4	5	5	4	5	5	5	3

(Appendix D continues)

Appendix D (Continued)

Part I: Planning, Design, and Site Selection

Q11.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	4	5	3	3	4	4	4	3	4	3
Q12.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	5	5	4	4	4	5	4	4	4	4
Q13.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	3	3	5	5	5	3	4	4	3	4	3	4
Q14.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	4	4	4	5	4	4	5	4	4	5	5
Q15.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	5	5	4	4	5	4	5	5	5	5
Q16.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	4	4	5	5	4	3	5	4	4	4	3

Part II: Environmental Factors: Aesthetic, Psychological, and Behavioral

Q1.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	5	5	5	5	5	5	5	5	5	5
Q2.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	4	5	5	5	5	5	5	5	5	5

(Appendix D continues)

Appendix D (Continued)

Part II: Environmental Factors: Aesthetic, Psychological, and Behavioral

Q3.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	4	5	5	5	5	5	3	5	5	5
Q4.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	5	3	2	5	4	4	4	5	4	5	5	4
Q5.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	3	4	5	4	4	5	4	5	5	4
Q6.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	5	3	3	4	4	3	4	5	4	5	5	5
Q7.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	4	3	4	5	3	3	5	3	4	4	5
Q8.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	5	4	5	3	5	5	4	5	4	5	5	4
Q9.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	4	4	5	5	4	4	5	4	5	5	4
Q10.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	3	4	5	4	4	5	3	3	5	3
Q11.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	2	4	3	1	4	3	1	4	5	3	5	5	5

(Appendix D continues)

Appendix D (Continued)

Part II: Environmental Factors: Aesthetic, Psychological, and Behavioral

Q12.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	3	5	5	5	4	5	3	4	5	5
Q13.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	4	5	4	4	4	5	2	4	5	5

Part III: Space Utilization

Q1.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	5	5	4	5	3	5	4	5	5	5	5	4
Q2.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	4	5	4	5	4	5	4	5	5	5
Q3.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	4	3	1	2	5	4	5	3	4	2	5
Q4.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	4	4	5	5	5	4	4	2	4	3	4
Q5.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	5	4	3	5	5	5	4	4	4	4	3	4
Q6.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	2	4	5	3	2	3	4	4	4	4	3	4	2
Q7.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	4	5	3	5	4	5	4	4	2	5

(Appendix D continues)

Appendix D (Continued)

Part III: Space Utilization

Q8.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	5	5	4	3	3	5	4	4	4	5	4	5
Q9.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	3	5	5	4	4	5	3	4	2	3
Q10.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	3	5	4	5	5	5	5	4	4	4	5
Q11.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	5	5	4	5	4	5	5	4	4	4	3	4
Q12.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	4	3	5	4	5	4	4	3	4	2	3
Q13.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	3	3	5	4	4	4	4	4	3	3	2
Q14.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	3	5	4	4	4	5	3	4	1	4
Q15.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	3	4	3	3	4	4	4	5	3	3	3	2
Q16.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	3	4	5	5	1	3	5	4	1	5	4
Q17.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	3	4	5	5	4	4	5	4	4	2	2
Q18.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	5	5	4	4	5	4	5	4	4	5	3	5

(Appendix D continues)

Appendix D

Part IV: Technology

Q1.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	3	5	4	4	5	5	4	4	3	4
Q2.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	5	4	5	4	5	5	5	4	4	3	2
Q3.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	3	3	5	4	3	5	5	3	4	3	3
Q4.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	3	5	4	5	4	4	5	5	4	4	5	4
Q5.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	3	5	4	4	4	4	4	5	4	3	4	4
Q6.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	3	2	4	3	3	3	4	5	4	5	3	2
Q7.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	3	5	4	5	5	5	4	5	4	4	4	5
Q8.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	3	5	4	5	4	5	4	4	4	4	5	5
Q9.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	3	5	3	5	4	5	4	5	4	5	4	3
Q10.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	4	4	3	4	5	4	4	4	4	4	3	4	3
Q11.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
	3	4	5	4	5	4	5	4	5	4	4	5	5

(Appendix D continues)

Appendix D (Continued)

Part IV: Technology

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
Q12.	4	4	5	4	5	5	5	4	4	4	4	4	5
Q13.	3	5	5	4	5	4	5	5	5	3	5	4	3
Q14.	2	4	5	3	3	4	4	5	4	4	4	5	4

Part V: School and Community Service Areas

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
Q1.	4	5	5	4	5	5	4	4	5	5	5	5	4
Q2.	3	4	3	5	5	4	1	3	5	4	1	5	4
Q3.	3	4	4	4	5	4	1	3	5	3	1	4	1
Q4.	4	5	4	5	5	5	5	4	5	4	5	5	3
Q5.	3	5	4	5	5	5	4	4	5	4	5	5	3

VITA

HAROLD EDWARD COFFEY

Education:	University of Virginia, Charlottesville, Virginia; Sociology, B.A., 1968. East Tennessee State University, Johnson City, Tennessee; English, M.A., 1973. East Tennessee State University, Johnson City Tennessee; Educational Administration, Ed.D., 1992.
Professional Experience:	English Teacher, Spotsylvania Jr. High School; Fredricksburg, Virginia, 1973-1974. Optical Internship, J. S. Reynolds Community College and Galeski Optical; Richmond, Virginia, 1974-1975. Private Business, Waynesboro Opticians; Waynesboro, Virginia, 1976-1989. Adjunct Faculty, English Department, East Tennessee State University; Johnson City, Tennessee, 1990-1991.
Professional Organizations:	Member, Phi Kappa Phi Member, Phi Delta Kappa Member, Council of Educational Planners, International
Honors and Awards:	Phi Kappa Phi Graduated Summa Cum Laude from East Tennessee State University, 1973. Doctoral Fellowship, East Tennessee State University, 1989-1992. Graduated Summa Cum Laude from East Tennessee State University, 1992.