Innovative Pedagogy and School Facilities

The story of the MET School in Rhode Island:
a drama, history, doctoral thesis, and design manifesto.

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Abstract

Several forces are converging to place school facilities design—particularly high school facilities design—at the center of national attention: 1) a resurgence of interest in high school reform, particularly focused on personalizing learning; 2) the growing number of alternatives to traditional high schools; 3) a crumbling physical infrastructure; and 4) a recognition that the prevailing physical characteristics of high schools serve as substantial impediments to fundamental reform.

When "form follows function" prevails as a design principle and the function is shifting fundamentally to address such concepts as meeting student interests, school facilities will need to accommodate different learning styles and contexts. Each set of stakeholders, however, will see the concept differently and imagine a different physical space. What are the forces at work and the tensions impacting these innovative school designs? How can we document and make sense of the process of translating innovative pedagogical designs into facilities designs?

This research examines the translation of innovative and complex school reform models, based upon nontraditional pedagogical models, into school facilities designs. This research identifies key factors facilitating and impeding the translation process. In addition, the research examines the dynamics of relationships between the numerous constituencies involved in the design process to understand how these relationships affect the translation process. A qualitative approach using in-depth case studies of a high school's facilities design process was employed. Interviews, analysis of the minutes of design and construction meetings, observation of the design process, and an analysis of the design drawings were used.

The research found three major forces at work. Several recommendations are made for addressing these issues. The results will improve educators' understanding of school facilities design processes and recommend approaches educators need to take in order to assure that their pedagogical designs get translated appropriately into physical designs. The research will also affirm the importance of the development of hypotheses for investigating specific forces and variables more precisely and intensively. Such research will support improved facilities planning for new schools and future plans to enhance student learning.

I. INTRODUCTION

Several forces are converging to place school facilities design-- particularly high school facilities design--at the center of national attention. These forces include: 1) a resurgence of interest in high school reform, particularly focused on personalizing learning (Littky & Allen, 1999); 2) the burgeoning number of alternatives to traditional high schools (Nathan, 1998) 3) a crumbling physical infrastructure (Moore & Lackney, 1994); and 4) a recognition that the prevailing physical characteristics of high schools serve as substantial impediments to fundamental reform (Copa, 2000).

Currently $20 billion is spent annually on the construction of new schools (Nair, 2002). According to *What If*, a report funded by the James Irvine Foundation in California, these facilities are "dinosaurs the day they open" (Bingler, 1999). One key factor contributing to the perception of these schools as "dinosaurs" is their large size plus their inability accommodate any redesign of a curriculum and create an environment that matches the new design. Research on small schools points to the benefits of developing small intimate settings for all schools and in particular high schools (*Breaking Ranks*, 1996; Klonsky, 1995). In October of 1998, the U.S. Department of Education and the White House Millennium Council cosponsored a conference on school design that came up with the following design principles for educational facilities:

- Enhance teaching and learning and accommodate all learners.
- Serve as centers of community.
- Involve all stakeholders in the planning/design process.
- Provide for health, safety and security.
- Make effective use of all available resources.
- Allow for flexibility and adaptability to changing needs.

These principles underscore the critical need to design schools that enhance teaching and learning for all students. A national survey of teachers, principals, and assistant principals found that 96 percent thought school design was an important part of a good learning environment (Shapiro, 1998). Not only is it important to design schools that are small, safe, and flexible; it is also essential for school facilities to contribute to improving education. The facilities design must enhance learning, where form follows function.

The facilities educators create for the new pedagogies will need to be very different from those in the past. What happens, however, when form follows function and the function is a shifting, sometimes amorphous concept such as meeting student interests or developing student projects? How do we build a facility that supports student work in outdoor settings? Each set of the stakeholders will see the concept differently and imagine a different physical space for its support. What and who are the impediments to these changes? How do educators, policymakers, architects, and construction specialists negotiate new educational facilities that reflect programmatic innovation with a broad constituency of groups?

Statement of the Problem

The principle of 'form follows function' prevails in designing high school facilities. Most school structures parallel their program designs that are focused on subjects, periods, classes, and so forth. The prevailing facilities design is part of the DNA of high schools. The image that architects and community members have of high schools is hard-wired as well. Despite the program design sessions that architects employ with educators, facilities design occurs within a narrowly constrained paradigm of learning, learners, and learning environments (Bingler, 1999; Copa, 1999; Fielding, 1999).

The education industry is currently developing innovative alternatives to the prevailing system (Nathan, 2000). As these new school reform models emerge, it is likely that pressures will increase for the development of a new paradigm for high school facilities themselves. Truly fundamental and innovative high school reforms will be at dissonance with traditional school facilities design. Structures that are large, compartmentalized, all-inclusive, and isolated from the community will not support such reforms. The facilities that educators create for the new pedagogies they want will need to be very different from those of the past. School facilities built in the last one hundred years reflect a factory model of education (Washor, 1996). In these facilities, students were instructed and directed to regurgitate facts rather than taught to use their minds well and solve problems that do not have canned answers. It was therefore relatively easy to create space that was inflexible and used for the sole purpose of delivering the same information to each student period after period (Copa, 2000; Fielding, 1999, May).

How can we document and make sense of the process of translating innovative pedagogical designs into facilities designs? Can we derive principles and guidelines for designing school buildings that are

consistent with contemporary knowledge about learners, learning, and learning environments? This research addresses these and related questions by examining the design and construction of an innovative high school.

The Metropolitan Regional Career and Technical Center (the Met) is a public, four-year high school that integrates academic and applied learning. The Met is managed by The Big Picture Company, a nonprofit organization. The researcher is co-director and co-founder of The Big Picture Company and superintendent, as well as co-founder and co-director, of the Met Schools. The Met is a small school that combines classroom learning with real world internships; it engages teachers, mentors, and family members to create personalized learning plans for each student, and it uses comprehensive assessment tools to measure students' performance (Steinberg, 1998).

The Met educates one student at a time, involving students in real work with activities outside the school. Each student is a member of a fourteen-student advisory group led by the same teacher for all of the student's four years at the Met. The curriculum goals address empirical, social, and quantitative reasoning, as well as communication and personal qualities. Students follow their own learning plans to reach these goals, focused on their own interests and passions. They must demonstrate their accomplishments and capabilities through multiple demonstrations, including exhibitions and portfolios.

The Met enrolled its first class of freshmen in the fall of 1996. Currently located at two campuses in Providence, the Met will grow to a projected enrollment of 660 students by 2002 and will be housed in eight small schools with a shared commons. The design and construction of the Met's facilities is currently under way.

The Met's learning signature of educating one student at a time in a community of learners is well outside the mainstream and is likely to remain so for some time. Nevertheless, the Big Picture Company, the nonprofit educational organization that developed the programmatic and physical design for the Met for the Rhode Island Department of Education, has received a $4 million grant from the Gates Foundation to support the creation of additional Met-like schools throughout the country. As Big Picture seeks to advise others, it will be important to include, in its package of technical assistance and support, guidelines for facilities design. Such advice and guidelines require a thorough understanding of the facilities design process as applied to highly innovative pedagogical designs. Without such an understanding, it is possible that those who wish to replicate the Met design will create facilities that actually impede their goals.

Research Objectives and Questions

School buildings rarely reflect state-of-the-art pedagogical designs (Bingler, 1999; Copa, 1999; Fielding, 1999, May). Although much has been learned over the last ten to fifteen years about learners, learning, and learning environments, these understandings seldom influence the design of school buildings.

The research is addressed to these major questions and several subsidiary questions:

Research Question 1: What are the forces at work in translating an innovative pedagogical and organizational school design into a facilities design?

Three specific questions are examined as they relate to this major research question:

- 1.1 What are the key factors that support or impede the translation process?
- 1.2 What are the dynamics of the relationships between the numerous constituencies involved in the process for designing and constructing schools and how do these dynamics affect the translation process?
- 1.3 What aspects of the Met program pedagogical design are viewed as essential by those constituencies?

Research Question 2: How do prevailing principles and practices of school facilities design accommodate the translation of innovative pedagogical and organizational school designs?

Three specific questions are examined as they related to this major research question:

- 2.1 How does the Met's program design align with prevailing ideas of school architecture and construction?
- 2.2 How well do prevailing school facilities design processes accommodate the essential Met program design components?
- 2.3 What aspects of prevailing school facilities design processes impede or facilitate the translation process?

These questions guided the development of specific interview questions and the identification of patterns and themes in the field notes and analysis of relevant documents.

Definition of Terms

Innovative. New to a situation, context, or environment. In this research, the term was used to mean both new and non-traditional. The Met design, as is the case of many alternative schools, is in sharp contrast to traditional models of schools and schooling.
Pedagogical design. The design of student learning opportunities and environments was based on literature, research, and best practice.

Background of the Study

Designing a school facility where the educational practices personalize and promote both one-student-at-a-time learning and build a community of learners is the key focus of the Met. This research will add to the scant body of materials presently available through data collection, design, and construction of the Met's new facility.

Five areas of research exist for both the theoretical and conceptual framework of researching and designing a small school facility that support the pursuit of student interest (interest-based learning). They are:

1. Interest and Motivation
2. Small Schools
3. School to Career
4. Educational Design
5. Learning Environments

Interest and Motivation

The notion of using student interest has its theoretical roots with many philosophers and research studies. In James's (1890), Dewey's (1896), and Montessori's (1966) work, student interest is the first and foremost place to start education. Grubb (1995), Csikszentmihalyi (1988), Cremin (1975), Sarason (1972), refer to Dewey's work on the pursuit of student interest as the practice in schools that would educate youth in a way that produces an educated citizenry. The research in educational psychology and neurology (Caine, 1998), (Wilson, 1998), (Hillman, 1996) point to the pursuit of student interest as a key factor in long-term, lifelong learning. Wilson (1998, p. 292) argues that schools should be places where students use their interests through hands-on experiences. He states "Almost all children who prove to be 'successful long-term learners' initiate a series of successful professional apprenticeships before reaching their teens. This is the ideal time for apprenticeship: the unique adult-child relationship, usually outside the immediate family, in which the child's imagination attaches to mature goals and to a mentor who's caring both about the child and about the activity can have enormous long-range consequences."

The National Educational Longitudinal Study (1998) and the Valedictorian Study (Arnold, 1995) further point out the deficiencies in our schools that are content driven and turn out students who may even learn to do well in schools but can't transfer school learning to learning in the world outside of school. In all of this work, it is difficult to point to actual designs of what a school facility looks like that carries out interest-based learning, nor are there school facilities that are pointed to as examples of places where the pursuit of one's interest is a practice.

In many instances (Bloom, 1985) where students have identified talents that could be nurtured in our schools, our schools fail our most creative, those who are potentially our most creative, and our most promising because they don't provide the necessary programs or learning environments for them to succeed.

Small Schools

There is abundant research on small schools versus large schools and the benefit of small schools (Cotton, 1994). The research on small schools continues to point to their benefit in urban areas (Klonsky, 1995). Although this research addresses the themes or predispositions of many of the small schools in terms of their philosophy and pedagogy, rarely has a school facility been built around these learning signatures (Lawton, 1999). Some examples of buildings designed and built around learning signatures are:

- The Fannie Lou Hamer School, New York City, built around a Habits of Mind theme (Washor, 1996)
- The School for Environmental Studies, Apple Valley, MN, environmental theme
- The Eagle Rock School, Estes Park, CO, care-taking, ecology and service themes
- High Tech High, San Diego (Pearlman, 2002) Educational Leadership around personalization, real world learning, and intellectual capital.

Even in these schools, research is scant as to how these learning signatures are translated into physical designs. What were the compromises and impediments to translating these learning signatures into educational facilities? Was the vision of the members of the design team in each of these building projects aligned with the programmatic design?

In the area of vocational and technical education, the National Center for Restructuring Vocational Education has been working with the

Council of Educational Facility Planners to look at changing school facilities for career and technical education. Although the New Urban High School Project, funded by the United States Department of Education, examined a series of vocational high schools that were selected based on their innovative school reform programs, there was little discussion in their programmatic principles or design plans regarding what a school facility should look like (Riordan, 1998).

Vocational, career, and technical schools have traditionally had features of their programmatic design as part of their physical design. The issues at many of these schools are that although they have programs that interest students, the practices many times disconnect academic work and maintain so much control that the experiences themselves tend to fall far short of their potential.

Recently, the director of the New Urban High Schools project, Larry Rosenstock, started High Tech High, a charter school in San Diego that encompasses the design principles of the New Urban High School. This school's thematic and eclectic approach to practice includes interest-based internships, and project-based learning in a personalized environment. This design is reflective of their philosophy and practice. The school opened in September 2000, but how much of their facilities design is really responding to their philosophy and school culture?

High Tech High-Los Angeles, Berliner & Associates
DesignShare 2003 Citation Award Winner, plans at:
http://www.designshare.com/Awards/2003

School to Career

School to Career with its emphasis on workforce development programs use the resources of the worksites and attempts linkages back at school, but there is the constant concern that schools are not equipped well enough to connect student work being done in the workplace with the work back at school (Riordan, 1998). In most cases, their practices of connecting academic and thematic education are only marginally connected, and we end up with schools that have not done much to redesign their existing space.

Recently, Peter McWalters, Commissioner of Education, submitted his findings on the breakdown of cost per pupil of all the career and technical schools in Rhode Island. This presentation showed that the career and technical school's budgets separated academic learning from career and technical and in essence were separate programs with little integration between academic and career and technical (Capital TV - Education Budget Hearings, 2000). In conclusion, there are two separately existing spaces to educate students, one for academic, and one for career and technical.

Educational Design

In the area of educational design and learning environments, there is little research on school design and its effects on teaching and learning (Lawton, 1999). George H. Copa, professor of education at Oregon State University, expects results in June 2003 from a study he is conducting on how the innovative designs at an alternative high school in St. Louis, MO, and the School of Environmental Studies affect learning.

For a study, The Center for Workforce Development at The Education Development Center in Newton, MA, observed and collected data at the Motorola Corporation and Siemens Power and Transmission and Distribution. Their findings have implications for schools regarding how people learn in corporate cultures. Their findings conclude that people learn best in one on one and small-group settings and that facilities need to be designed to foster such meetings. (Stamps, 1998).

Copa's (1999) study also recommends opening new schools to the community. Family engagement at the high school level is one such priority. What is the space that is needed that engages families around their students? They will need to have meetings andsee their children perform.

Learning Environments

If students' interests are engaged and learning environments exist both inside and outside the school building, the technology is the glue that will hold this

together (Schank, 1999). How can putting computers in schools increase students' interest in their projects outside the school building, and how can it support their work when they are back at school?

The notion that school design must remain flexible and yet accommodate school programs is a perplexing problem. Space has been multipurpose for years, but there is also the type of flexibility that needs to be imposed that allows a school to change its space to accommodate new programmatic designs. In the past, when flexible walls have been installed, there have been little changes made to the physical design.

All of the above theoretical and conceptual frameworks are connected to the development of complex pedagogical designs. Few have taken on the task of translating these designs into physical designs, and when they have, research is slim as to whether they have been successful in what they have sought to do. They show that there is a pressing need for research on the design, development, and connection of a school's facilities to their actual programs. This proposed research will not only help other schools using the Met as a model but will be "an oasis in a desert," where there is a resurgence of energy around student interest, innovative educational programs, and a school facility.

Montessori's (Montessori, 1966) learning environment aligns with form follows function, where students use their hands and minds in a variety of different areas of the room specifically designed for language, math, and sensory exploration. Here different classroom "tools" are put in specific places for specific uses for math, language, and movement. The spaces reflect the practices in which students are engaged around their interests. What do these spaces look like compared with other educational designs?

Roger Schank (1999) points out that schools need three environments to provide for learning. They are focused work, collaborative work (social), and hands-on project work. These spaces can be either inside or outside of a school. He comments that there are very few schools he has been able to identify that follow his model.

Both Schank and the Met's philosophy entertain a different notion of what space outside of a community might become as part of the learning environment of a school. For example, when parents enter onto the scene of learning in meaningful ways, the space of a facility must also flex and change. At the Met, spaces are needed for private meetings around learning plans where parents are now part of a learning plan team (Littky, 2000). The issue of space and programs are too immense and complicated to resolve as new learning environments.

Methods and Procedures

This qualitative research employed a case study design as its major methodology (Yin, 1994). The study investigated from several perspectives the school facilities design process employed to design the new Met school. Such a methodology is most appropriate for describing, understanding, and explaining a phenomenon (Merriam, 1998). "Qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world." (Merriam, 1998, p.6).

The case study employed several data sources and methodologies addressed to the major research questions that included people, events, and documents. Methodologies included literature reviews, interviews, participant observation, and document analysis.

The research was conducted in two stages. Stage 1 included a detailed literature review and analysis, which was ongoing throughout the research and integrated into data analysis. Also in this stage, the researcher interviewed and consulted with several national architects and school facilities designers in order to identify specific variables of interest related to the major research questions. The outcome of stage one activities was a specific list of variables that were used to identify probes within the major questions.

Stage 2 employed in-depth interviews, participant observations, and document reviews. Interviews were conducted in waves followed by analysis, and additional interviews of key informants continued until data saturation was achieved. Key informant groups included architects, educators, parents, and government officials. Observation notes and document analyses were conducted to triangulate on key variables that emerge. The researcher collected extensive information from all design meetings conducted through March 2002. There data was analyzed using appropriate quantitative methodologies (Miles & Huberman, 1994). The analysis converged on a small set of dimensions that appeared to best illuminate the dynamics of the design process and provided the most explanatory power to support high internal validity and to support limited external validity.

Several events were documented:

1. Facilities Meetings
2. Minority Business and Women Business Enterprise meetings
3. Community meetings
4. Construction Meetings

The researcher used personal journals to recall and analyze observations about meetings and design iterations. All stakeholders were interviewed with a set of questions. The stakeholders included staff from the Department of Administration, the Department of Education, the architectural firm Concordia, staff, students, and parents at the Met, and Minority Business Enterprise. The researcher took the necessary license to probe when responses triggered a further elaboration of answers.

The researcher collected and analyzed data from the minutes of the facilities meetings to identify decisions made about the facilities design that either incorporated, or failed to incorporate, the key programmatic features. The researcher conducted a content analysis of the minutes of community meetings and charettes, reviewed the design plans, and reviewed the entire Met project.

Data collection included interviews with other educators and architects who believed their programs translated complex pedagogical designs into facilities. Their programmatic signatures were identified and they described the physical features of these learning signatures. What were the manifestations of their program? What were the problems they had in translating these designs and with whom?

Limitations and Delimitations

The use of multiple methodologies and multiple data sources that focused on a select set of variables produced strong internal validity. The potential for bias inherent in participant observation was balanced by interviews and document analyses to ensure a robust triangulation on the variables of interest.

As in most qualitative research, external validity was limited to the match between the particular research setting and other external settings. While the Met design is highly innovative and atypical, its particulars do not compromise substantially the ability to generalize to other situations in which facilities are designed to accommodate highly innovative educational designs. It is up to the reader to decide if the political, organizational, financial, social, and educational circumstances are sufficiently similar to justify generalizability to other settings. The analysis yielded valuable insights and recommendations regarding the facilities design process to those charged with designing facilities that support high school reform.

Actions to Result from This Research

The Bill and Melinda Gates Foundation awarded the Big Picture Company $4 million to start twelve Met-like schools in twelve cities around the country. The results of this study were utilized in the design process and in influencing the design of these future schools. Beyond this immediate need, there is a growing sense from the work of reform efforts--like the Big Picture Company's, The Centers for Collaborative Education in New York and Boston, and The United States Department of Education's Small Learning Communities Grants--that research on facilities design and new practices to help design future facilities will need major overhaul in the coming years.

II. Review and Analysis of Research and Literature

In a recent commentary in Education Week, Prakash Nair, international planner and architect, stated that America spends more than $20 billion annually to build and renovate schools with little thought as to whether these funds are supporting or improving learning (Nair, 2002). He points out that most facilities projects focus on creating safe, clean, and comfortable schools but they do not focus on how they improve learning.

The images he ascribes to schools as being places to "warehouse children" (p.60) are juxtaposed against an education and construction industry in the business of school construction that is "literally designed to weed out any potential for a completely creative solution (p.60)." This is why so many schools look alike and design doesn't change.

The problem of translating pedagogical designs into facilities has political, economic, and social forces at play that work hard to keep school buildings as they have been for the last 100 years. The specialty areas involved in school design, construction, and education have been regulated so much that the best of intentions are constantly being met with failure to produce schools with better learning environments.

This review seeks to find evidence in the research regarding the ways in which complex pedagogical designs get transformed into facilities designs. Facilities design is examined from the perspective of architects, educational researchers, psychologists, and school practitioners. These perspectives encompass five major areas of educational research and literature that are closely connected to design elements in the Metropolitan Regional Career and Technical Center (The Met):

1. School Facilities Design
2. Learning Environments
3. Interest and Motivation
4. Career and Technical Education
5. Small Schools

The review was organized in this manner to facilitate an understanding of the existence and extent of dissonance or agreement among and between these perspectives for translating pedagogical designs into facilities designs. The summary of the review places the context of the analysis in relation to the Met and guides the identification of specific research questions.

School Facilities Design

> "We shape our dwellings and afterwards our dwellings shape us."
> Winston Churchill

In a 1995 *New York Times* article, "Record Cost Cited to Rebuild Nations Schools," Applebome reported on the state of school buildings. The article discussed Illinois Senator Carol Mosely-Braun's battle for federal funding to rebuild the nation's schools at an estimated cost of $112 billion. Mosely-Braun asked, "Are we providing the physical environment for education our children need as they go into the next century? The answer is a resounding no." (Applebome, 1995, p.1). The article reported that the United States Department of Education spent $20 million in 1995 to renovate its headquarters, while turning down $100 million earmarked for school renovations. Applebome cited data from the American Association of School Administrators indicating that of all the nation's schools, almost a third were built before the 1950s and forty-three percent were built in the 1950s and 1960s. Virtually all of these facilities are due for replacement because of their poor condition or because their configuration and technological capabilities are inadequate for the demands of current education.

Applebome reported that issues of class size, standards and assessment, and teacher salaries are in direct competition for funds to build and renovate schools. He quoted Jeff Schneider, political analyst for the National Education Association, as stating, "But merely having a brand new building with lots of stuff does not guarantee high achievement. That has more to do with the decision making around each child and their education" (p.1). This comment remains as important today as it was in 1995. Indeed, the comment may be even more important today because schools are being built, as the research shows, with little evidence that architects, politicians, educators, and researchers understand that facilities design decisions should be made around each child and each child's education.

By mid-December 2000, the emphasis on school construction had changed dramatically. Both Houses of Congress passed a year-end budget agreement that included major increases in school construction. Outgoing Education Secretary Riley urged the passing of a United States House of Representatives bill sponsored by Representatives Charles Rangel (D-NY) and Nancy Johnson (R-CT) containing a proposal to allocate $24 billion for interest-free school construction bonds. Although the bill did not pass, the school construction business is booming with no slowdown in sight. Reports are that school construction could top $300 billion during the next decade. Some experts are reporting that multi-million dollar projects are attracting no bidders because of the high level of activity in the school construction business. David Soleau, President of Flansburgh & Associates, Incorporated, a Boston architectural firm

specializing in school construction, states that driving this increase in construction is the fact that "there are more kids now in school than in the 1950's and 1960's and all those kids have to sit somewhere" (Singer, 2001, p. 56).

Is increasing seating capacity driving the design of schools? Or, as Schneider says, does design have more to do with decision making around each child and his or her education? What are the real political, economic, and social forces at work that stop the design of schools from focusing on each child?

The educational research on the effects of school design on teaching and learning reaches conflicting conclusions. Lawton (1999) reports that there is little research on school design and its effects on teaching and learning. Conversely, Lackney (1993) reports on a number of empirical studies researching the explicit relationships between facility characteristics and educational outcomes.

In a series of articles in *The New York Times*, Ted Fiske (1990) reported that certain design characteristics, such as school size, classroom size and location, and the provision of secluded study spaces, all make substantial differences in learning outcomes. In particular, school size and classroom size made a difference in academic achievement. The discrepancy regarding whether there is scant research or ample empirical evidence may lie in the interpretation of what constitutes research on school design and innovative school design.

One can easily find research on the topic of environmental concerns and school design. DiNocola (1996) reports that in the 1980s the prevalence of asthma grew by 60 percent. Today asthma is the leading cause of school absenteeism. Thirty-one percent of public schools in the United States were built before World War II. These schools have a life span of about fifty years. Another 43 percent of public schools were constructed during the 1950s and 1960s; the life span of these schools is about thirty years. In addition to having poor air circulation, these buildings have many exposed hazardous chemicals as the buildings deteriorate. Such chemicals cause a health hazard to young children who are even more susceptible than adults to respiratory infection and lead poisoning. Although drawing from an environmental standpoint, DiNocola reaches the same conclusion: The nation's schools are in need of $112 billion in repair. Yet, year after year proposals from federal, state, and local governments are, for the most part, turned down (DiNocola, 1996).

There is also evidence that, in addition to health issues, school design is affected by other environmental factors that have little to do with pedagogical reasons for design changes, but rather for how healthy facilities can impact learning. In *A Pattern Language*, architect Christopher Alexander (1977) describes the messages buildings communicate about the function they perform and the way their design influences human behavior. He describes the backlash of over thirty years of building windows for reasons of security, outside noise, high maintenance costs, and the introduction of air conditioning. Alexander also discusses the fact that the open classroom concept created pods with windows, but construction companies and architects designed the same schools with fewer windows to save on costs. They misunderstood the concept and looked for economic savings.

Lackney (1993) points our that the open classroom design failed, not because of its function, but because architects built the schools modeled after the British Open System without telling American educators who were never adequately trained in the open system concept. The Americans kept on teaching as they always had in rooms made for a different purpose. Then, Americans claimed the architecture did not work. This case exemplifies a disconnection between training and professional development, not a poor design.

A study by the Heshong Mahone Group for the California Board for Energy Efficiency and Pacific Gas and Electric (Kennedy, 1999) found that there was a statistically compelling connection between day lighting and student performance. Students in rooms with more light progressed more quickly than students in less naturally lit rooms. In Capistrano, California schools, students progressed 15 percent more quickly in math and 23 percent more quickly in reading. The Heshong Mahone Group concludes that putting more windows in schools will not increase their cost or reduce their energy efficiency because new materials, such as tempered glass, laminated glass, and blinds, help save energy. The question is: Why are the results of studies on the affects of these innovative materials not used? The answer may be that these groups of architects and educational researchers rarely talk to one another. The language of their fields is different and no one takes the time to translate across professions.

A school's location has been found to have an impact on learning but not through translating pedagogy into facility design. Gary Evans (Evans *et al*., 1991), in *New Directions in Health Psychology Assessment*, concluded there are significant increases in students' blood pressure associated with schools being located near noisy urban streets. Exposure to traffic noise at elementary schools also has been associated with deficits in mental concentration (Evans

et al., 1991). The research done on school environment and learning and on architectural design is conclusive enough that such environmental conditions are now known to lead to significant and substantial differences in learning achievement (Moore & Lackney, 1993) But, as Moore and Lackney (Moore & Lackney, 1993) point out, "there are still ways as yet to be determined in which architects can give form to emerging educational concepts" (p.104).

Moore and Lackney propose two means by which school design can do the work of giving form to emerging educational concepts:

1. Translate the empirical research literature on the effects of school buildings on educational performance into research-based design guidelines, patterns, or design principles. Then, work to implement those design guidelines in new and renovated building projects.
2. Extrapolate from educational reform ideas or the experience of reflective educators in order to give ideas architectural form.

Moore and Lackney conclude that it is clear that physical environment has been unappreciated for its supportive role in student learning. Their conclusion is that the physical environment can be a major reform element. In the end, the relationships among the physical environment, pedagogical, psychological, and social variables have yet to be explored to any great extent by educational researchers, child development researchers, or environment-behavior researchers.

Nair (Nair, 2002) points out that in the ten years since Moore and Lackney's research little has changed. The educators stay concerned with practice and the architects with innovative constructive design techniques. usually borrowed from other public and private projects (Lackney, 1996).

There is a small group of architects who do understand the dilemma of translating pedagogical designs into facilities. These architects have developed design processes for translating complex pedagogies into facilities. They also envision schools that look very different from the schools we have today. Architect William Day (http://www.kbdplanning.com/vision.html, 2000) writes:

> For the most part a new look at school planning and design simply does not have the full attention of either educators or architects. Precious little has been done over the past twenty-five years to reflect on the relationships of good school design to educational program effectiveness. Very little effort is being given by either educators or architects on the many design decisions, which a responsible architect has to make in the course of designing, renovating, or expanding a school building. To this end, educators need to become more designers and reflectors of their environment and architects need to listen better and ask if their architecture matched the school practices.

Day refers to all the issues of educational innovators: accommodating learning styles, use of technology in lieu of a text-based environment, changing room configurations from rows of seats to learning centers, community access to schools, team teaching, nooks for independent student work, private areas for meetings with teachers, real-world learning, and learning as an active process where students create what they are learning. Although Day does not point to any places where his notions about what schools will look like have a programmatic or a physical manifestation, he is clear about how such schools might look different from today's schools.

George Copa, Professor of Education at Oregon State University, at a conference in Amsterdam on design concluded that, "architects should design for coherence, taking into account elements such as organization, partnerships, technology finance, and future expectations"(Copa, 2000, p.3). In an earlier study, Copa (1999) makes a recommendation to open new schools to the community. He cites family engagement at the high school level as a priority and asks what space is needed to engage families around their students. Among other items, space allocation for family engagement meetings needs to include space for learning plan meetings, assessment of student learning, the planning of family events, and health and human services support. While numerous foundations and organizations such as the Casey Foundation, The Metropolitan Life Foundation, and the National Public Education Fund support research to develop programmatic design, there is scant evidence of designed space for these family programs beyond having a room in which parents may conference with staff and meet one another.

Architect and school designer Prakash Nair (2000) looks at school design through the lens of 15 trends occurring in the field of education that are related to educational technology:

- Ubiquitous computing

- Wireless networking and robust Internet access
- Technology-intensive teaching and learning
- Emphasis on informal learning (less than 25 percent of all learning occurs within the classroom)
- De-emphasis of classroom
- Food court vs. cafeteria
- Shared common areas
- Imaginative furniture design
- Team teaching, non-chronological grouping, and interdisciplinary curricula
- Students creating products for business
- Emphasis on service learning (meaning?)
- Computer labs replaced by distance learning electronic studios
- More high-tech production facilities
- New learning partnerships with other schools and universities
- Parent and community education programs in schools

A traditional educator would, most likely, inevitably agree with every one of these trends, especially the use of technology. Yet, even when technology is used, there is still a great debate about how innovative its use is in schools, or whether it is used to deliver the same materials over computer networks with students at computer stations instead of taking instruction from a teacher. How all these trends are made manifest as program and design is still a large issue with no supportive research and few practical examples. Indeed, Nair does not mention how these trends are designed into new or existing schools, what the problems are in creating these schools, or where one can see these designs in a school setting.

Lackney's research (1996) points out a number of significant findings for schools under the category of public buildings. In his study on public vs. private building projects, he draws the following two conclusions:

1. Operating within a complex process leads to a complex project that requires more time and higher costs. In four out of five cases, public projects took 80% longer to design, 101% longer to construct, and cost 11% more.
2. "Top-line factors" significantly influence Public Sector decision-making procedures resulting in a project that is more complex that requires more time and higher costs but has greater public accountability (Lackney, 1993). In other words, bureaucratic oversight and public process affect time and costs.

Furthermore, Lackney found that "state" work did not offer much opportunity for large profits but were "bread and butter" kinds of jobs that provided stability in a firm's practice. Lackney points out that the public may be paying more for durability and conformity to societal goals. What is given up for these attributes is flexibility in design and a faster rate of construction.

Given these findings and given the cost and time an innovative school design might take and the risk that the innovative design might not ever be used again, there is not much incentive for an architect or a builder to pursue innovation. This process may be a determining factor in squashing innovation.

Three themes emerge from a review of research and literature on school facilities design. First, facilities designs have been shown to have an impact on learning. Second, these designs have been shown to have an impact on students and others who work in the schools. Third, there have been few innovations in school facilities design. All three of these themes were examined in this research. The latter theme is not comprehensible given the first two themes. The factors and forces at work halting the innovations are clearly entrenched in education, architecture, construction, and government.

Learning Environments

> "Reform the environment: stop trying to reform people. They will reform themselves if the environment is right."
> *Buckminster Fuller*

A review of the literature and research on learning environments with regard to lighting, noise, air quality, and spatial distance between students and teachers leads to mostly common-sense solutions to designing schools. The research recommends an abundance of natural lighting (Hathaway, 1995; Hathaway, 1993; & Ott, 1976), lower noise levels from streets, airports, and trains (Bronzaft & McCarthy, 1975; Christie & Glickman, 1980; Cohen, Krantz, Evans & Stokols, 1980; & Evans, & Maxwell, 1997). Furthermore, there is a collection of research (Caine, 1994) that reviews discrete issues in room temperature, chair design, and time of school day.

Sarason (1971) refers to another type of study on the classroom-learning environment that sounds simple but turns out on analysis to reveal amazingly complex issues. Schwebel (1969) studied how teachers seat students in classrooms. His results revealed unwritten and seldom stated rules of student seating in classrooms that as Sarason concludes: "The relatively unimportant problem of seating within it [has] all the constitutional issues raised" in his book (p.225).

Although these issues affect learning in any school environment, they do not specifically impact the realm of school design for translating innovative pedagogy into facilities. The focus of this literature review is specifically on translating innovative pedagogy into facilities, but there are educators who did more intentionally look at the learning environment and design school space based on their pedagogy.

In the late nineteenth and the early twentieth centuries, there were many educational progressives who took an interest in the learning environments as they set up their schools. Maria Montessori (1966) designed school space in her classrooms that reflect 'form following function' in a whole school design philosophy. Classroom space was designed to reflect the Montessori philosophy of education as student-centered learning that connects mind, spirit, and hand. Stations were created for hands-on exploration, math, writing, and the arts. This environment was designed to allow students to explore and discover on their own. Materials were either specifically designed by Montessori or recommended for use with students. To this day, they exist in Montessori Schools.

When he was superintendent of schools in the late 1800's, Francis Parker's vision for learning was also a child-centered approach to learning that became known as the Quincy System. Student interest and motivation were key to this system. Students were active learners as they learned by doing and expressed themselves through the arts. They moved through the system by demonstrating their performance through exhibitions and long-term projects. Students had small classes and an advisory system where they were known well by their teachers. Staff designed and revised the curriculum to reflect student interests and needs to promote engagement. This system reflected Parker's knowledge of studio-based learning from schools of architecture in France - Beaux Arts and Germany - Bauhaus (Lackney, 1999). Most of the architecture in the schools was from a different era, and rooms were still regular classrooms and auditoriums. In most cases already, existing space in schools was used. Although the pedagogy was innovative and the relationships between student and teacher were very important, the facilities design did not reflect these educational practices.

John Dewey at the Laboratory School in Chicago was also influenced by Bauhaus and the studio approach. William Wirt, a follower of Dewey's progressive approach, designed Horace Mann High School in Gary, Indiana. Wirt redesigned the learning environment around an experiential mode of learning. The school had adjacent parks, zoos, and a farm where students harvested crops. Activity-based learning and the school's role in the community were emphasized (*Ed Week*, 1999). At Horace Mann, students used the auditorium for presentations of their work, and at night, the auditorium was used to present students' work to their families.

The Reggio Emilia preschools also have developed their own learning environments. The founders of these preschools believe that "the school's environment is the third teacher and is crucial to the early childhood program (Giudici & Rinaldi 2001, p.59). There are over thirty of these schools in the area around Reggio, Italy, and a growing number internationally. At the Reggio preschools, staff members have designed their learning environments around two mottoes: "nothing without joy" and "students learning from one another in groups" (p.59). The staffs at Reggio have designed their own furniture for each of the rooms in the school. They have specifications for inside space for their children's dining room, art studios, and outside garden space. Their schools are filled with an abundance of high-quality art materials to allow students to design and construct their work. There is ample space in each area to display student work both in its original form as a full project, as well as photos and art on walls. Student workspaces are designed for small groups of students to work on projects with space enough for staff to gather around to document student learning. Staff members also have meeting rooms where they can discuss their documentation of student work (Edwards, Gandini & Forman, 1998) (Katz & Cesarone, 1994).

Reggio schools have successfully translated their philosophy into facilities design. They have been thoughtful in their approach and understand the value of a facility that supports their work and their children's work. The Reggio schools stop at the end of kindergarten. There is no indication that they will ever attempt to go further with their philosophy into elementary or high school. The school system of Italy after kindergarten is completely based on rigid standards for each grade. The practices of the Italian system are completely different in pedagogy from Reggio Emilia.

At the Apple Valley two-year alternative high school, School of Environmental Studies at the Minnesota Zoo, the learning signature is interdisciplinary and theme-based study. This school has four hundred eleventh and twelfth graders. It is environmentally responsible in design and operation. The materials used in construction are environmentally sound with as little disruption of the natural environment as possible. The school has a workspace

for each student, project areas, and rich technology. There are large group meeting areas, as well as areas where small groups of students can meet around projects (Copa, 1999). This school was designed as a magnet and has not been replicated. Given its successful practice, one needs to ask why not?

Over the past ten years, innovative ideas about learning environments have been put forward by educational designers (Copa 1992, Fielding, 1999, Jilk 1994 & Schank 2000). Most of these ideas deal with developing innovative learning environments at high schools and use terms such as learner-focused and learner-centered environments as opposed to terms such as tracking and ability-grouping environment, even though most work, even if it is problem based, is still delivered through courses and classes. Copa (1992) put forward a design for the New Vision for the Comprehensive High School that included the following design features:

- Guaranteeing a set of learner outcomes linked closely to future life roles and responsibilities for all students
- Learning expectations, which include both knowing and applying learning in life situations, using authentic assessment
- Multiple ways to learn that are responsive to learning styles and interests
- Integration of high-level academic education and modern vocational education for all students
- Partnerships with parents and families, business, industry and labor, community-based organizations, and other schools to diversify learning settings and improve learning effectiveness
- Special character or focus to the school that gives coherence and spirit to learning
- Operation as a learning community that pays attention to caring, attachments, and expectations often requiring the subdivision of large schools into smaller units.
- Alignment and unification of the components of the school in the interests of quality and efficiency
- Decision making that is consistent with overall aims yet is located close to the problem at hand
- Partnership with the larger community as a way to make learning up to date and meaningful (p.16)

Copa (Jilk & Copa, 1997) employs a Design Down Process that helps schools develop learning signatures, learner outcomes, learning organizations, decision-making, learning partnerships - with parents and families, community-based organizations, business and industry, other schools, staff and staff development, and learning technology. These partnerships vary with the learning signature and learner outcomes of the school. The Design-Down Process is what brings the communities needs into focus. All of these processes are intended to create new learning environment designs based on innovative pedagogies. These spaces include open areas; small cubicles designed for five to ten participants, larger gathering places, and a number of individual and independent learning places. The School for Environmental Studies is an example of a school that used Copa's process. The question is why has only one school like this one been built with this process? How strong are the forces of the status quo that keep more from being built using this process and what are they? Is the process getting the results it was intended to get? Is there something wrong with designing down, or is there something wrong with the system?

At the Eagle Rock School in Estes Park, Colorado a school nestled in Rocky Mountains National Park, the buildings have been constructed directly into the slope of the mountains and are the same color as the soil. The buildings are designed in this manner to honor the environment, which is one of the main tenets of the school. The outdoors is a classroom.

The school encompasses 640 acres of forests, meadows and rocky
peaks. The campus is 140 acres, with the remaining land in a conservation easement to protect it from future development. There are twenty-one buildings totaling nearly 100,000 square feet. The facilities are construed as a learning village made up of laboratories, workshops, seminar-style classrooms and a library; a human performance center incorporating a gymnasium, pool, stage, exercise room and climbing wall; a lodge with dining facilities and a hearth area; living quarters for students and faculty; and an administration building and professional development center. This professional development center features a reception area with a fireplace, comfortable seating, library, and kitchen; a large seminar room; two smaller seminar rooms; two casitas that each sleeps four people; and a bunkhouse that sleeps sixteen people.

The center of each student's experience at Eagle Rock School is life in the learning community. Academics, social interaction, governance, cultural activities, service projects, and outdoor education are integrated into a living and learning environment. The distinction between in-school and out-of-school is blurred because learning takes place throughout the day. The school encourages a sense of belonging, ownership, and pride by involving students in school decision-making and service projects in the school and

surrounding communities. This sense of community is developed with the hope that it is carried along with each student when they move on from Eagle Rock School.

All students at Eagle Rock do the Wilderness Experience, a 21-day challenge that integrates outdoor adventure with service and academics. Students are transformed by this experience, and then are ready to transition into the rigorous academic challenges of Eagle Rock.

Other learning signatures of the Eagle Rock curriculum include:

- Service integrated into all learning experiences.
- Reading, thinking skills, writing, and speaking incorporated into all learning experiences.
- Demonstrations of presentations of learning at regular intervals.
- Immersion experiences in the arts.
- Hands-on, project-oriented learning activities.
- Character development as a theme that interweaves through all learning experiences.
- Academic advisories during which adults on the campus work with a small group of students on their academic progress.

Upon arrival, students must scale Eagle Rock, which is a formidable climb that is as tricky as any novice ropes course. The buildings have been designed to reflect the small intimate scale of the school. Eagle Rock has small seminar rooms for book and project discussions, computer stations with Internet access, and rooms for public student exhibitions called "presentations of learning,"

The landscape and the inside space reflect the rigor of school life. In the lodge/cafeteria, there is ample space for the whole school to gather for daily meetings and meals. When the American Honda Corporation funded the design and construction of the school, the corporation insisted on some specifications for the interior space for staff and students. The office space for staff was set up like any corporate Honda office with no one having a corner office or private room space. All offices have 36-inch system walls. According to Lois Easton, Director at Curriculum at Eagle Rock, this is one of the few non-negotiable items of the architecture. This office design is the look of the corporate culture at Honda, and in order to give the school the "look and feel" of Honda this design element was insisted upon.

There is research that supports quality learning in many of the design elements in schools that have attempted to translate their pedagogical designs into learning environments. Schools utilizing small spaces in their innovative pedagogical designs are supported by research that finds that smaller clusters lead to increased use of learning materials (Weistein, 1981) and to increased substantive, content questions (Evans Lowell, 1979). Moore and Lackney (1993) found that architecturally well-defined behavior settings, in contrast with partially and poorly articulated settings, contribute to a significantly greater degree of engagement with learning activities, more teacher involvement with children, less teacher interruptions, and more exploratory behavior, social interaction, and cooperative behaviors among children. Furthermore, after analyzing the results of the National Longitudinal Study of Adolescent Health, Fletcher (2002 p.103) found that "students who attend small schools are less likely than others to engage in risky behavior such as drug use, violence or early sexual activity, largely because they feel better connected to their teachers and one another." The study did not refer to any design elements common to the schools except they were considered small. This is the first study that points to school size as a factor of student health and behavior.

A further look at the research in the corporate world yields findings that support those of Copa (1992, 1999) and Jilk (1994), and of how to rethink learning environments and design processes. The Center for Workforce Development at the Education Development Center (EDC) in Newton, MA, studied the corporate environment at the Motorola Corporation and Seimens (Stamps, 1998). Their findings have implications for schools regarding how people learn in corporate cultures. These findings conclude that people learn best in one-to-one and small-group settings and that facilities need to be designed to foster such meetings.

Roger Schank's latest work at the Institute for Learning Sciences (ILS) proclaims, "Classrooms are out! No more classrooms! Don't build them!" (Fielding, 1999). Like the work at EDC, Schank's work has been spawned from his research in the corporate world about how people learn. His ideas regarding learning activities and cycles were tested and refined while developing training programs for private industry. Anderson Consulting is an international leader in business consulting and spends over $200 million each year on training its project managers. While Schank was teaching at Yale University, Anderson offered him $30 million to develop a program to "fix computer learning" (Fielding, 1999) According to Schank, this offer did not interest him. Instead, he told Anderson he wanted to "fix education" (Fielding, 1999). The ILS found that what was wrong with corporate training programs was that they were modeled after school and university learning models. The ILS steered Anderson away from the traditional

classroom model and towards a "virtual learning" model. (Fielding, 1999).

Schank wants to see schools eliminate classrooms as the central learning environment. He believes students' time should be divided equally between computer work, talking with others, and making something; none of these activities requires a formal classroom. Schank emphasizes the act of doing something, as the best way for learning to occur, and he thinks that computer simulations that engage students through experience-- allow them to grapple with failure and develop emotional connections with the experience-- are the best solution for student learning. Schank believes that virtual universities via the Internet will eventually be in direct competition with the existing secondary and university system, thus creating a virtual learning environment, (Fielding, 1999; Schank 2003) identified these environmental implications from his work:

- Computer-based learning is best suited to an individual workstation not a classroom.
- Talking or social learning lends itself to small, coffee shop-like spaces, where learners can gather informally.
- Learning by "doing" can happen in a wide variety of environments, including gardens, science labs, technical shops, and dance studios.
- Environments for computer learning, social learning, and active learning by "doing," need not be located on school grounds.
- Museums, hospitals, businesses, parks, and private homes are all environments, which can support learning.

Furthermore, the move to design office space has focused around a trend toward customization, giving workers more privacy, personalization, and a mix of autonomy and interaction. This movement is pitted against a still strong Taylorist legacy to design office space in the factory model that treats workers as automatons. The new spaces meeting the needs of 21st century workers are:

- Dens for informal working spaces where tasks are short term and intense
- Cells for individual work that require little interaction
- Clubs for teams occupying space on an as-needed basis using a wide range of facilities (Gary, 2001)

Finally, Schrage (2000) studied architect Frank Gehry, and found that his fame as an architect is not about his ability to draw, but about his ability to unite all the different players including the architect, engineer, contractor, and owner with one modeling system. The major innovation in the translation of an idea to a design is the inclusive process.

This research into corporate America presents what corporations want in the workplace. The research indicates that these innovative corporations are on the same path as innovative schools to develop similar learning ecologies and design processes. The other interesting commonality is that, when business world studies, such as those undertaken at EDC and ILS, engage the world of corporate learning, they have a similar issue of translating their pedagogies or cultures into learning environments. In many cases, there is crossover in what is adapted as a learning environment at schools and corporations. Both designers and educators may run the risk of being corrupted by the larger system when translation is carried out and the reform does not take hold. The economic, political, and social forces at work can be aversive to change even after the design innovation has been built. The training and culture to use the innovation needs to be in place in order for the new mental model to root itself (Senge, 1994).

Herb Childress's (2000) ethnographic study, *Landscapes of Betrayal, Landscapes of Joy,* demonstrates how our buildings and landscapes (and the institutions that shape them) systematically shortchange our kids, eliminating opportunities for challenge and growth and encouraging their passivity. Childress followed 12 teenagers attending the same high school in California for a year examining the places where the kids were devoted and worked their hardest and were at their best. Childress makes a thirteen points that exemplify how much of our school space and the lives of teenagers are compromised by the adult world. Although he does not offer solutions, his list does suggest what shape and function landscapes of "joy" would represent (Childress, 2001, p. 300-310).

Modernist idea #1: Kids and adults should be separate.
Existential idea #1: Kids and adults should be integrated, with teenagers welcome in the adult world.

Modernist idea #2: Children are the passive receivers of education and services.
Existential idea #2: Real learning involves an active search for experience and knowledge.

Modernist idea #3: We live in a national and global economy, and mobility is inevitable.

Existential idea #3: The local is of deep and lasting importance.

Modernist idea #4: Conflicts are decided in favor of those who have the resources to prevail.
Existential idea #4: Conflicts are decided in favor of the person or group with fewer resources to buffer any ill effects.

Modernist idea #5: Economies of scale are sensible in all areas of life.
Existential idea #5: Small and many are beautiful.

Modernist #6: People are, most centrally, consumers.
Existential idea #6: People are, most centrally, citizens.

Modernist idea #7: Objective, consistent, and encompassing rules and codes are the basis for interaction.
Existential idea #7: Negotiated agreements are both achievable and desirable.

Modernist idea #8: Social classes and their neighborhoods should be separate.
Existential idea #8: Social classes should claim their own spaces, but should also come into regular contact with each other as citizens and equals.

Modernist idea #9: Business, services, and residences should be separate.
Existential idea #9: Zoning should be primarily by scale of development rather than by type.

Modernist idea #10: Countryside is a necessary refuge from undesirable city living.
Existential idea #10: Countryside and city life both contribute to a complex, satisfying landscape.

Modernist idea #11: High densities of people are unsafe and unhealthy.
Existential idea #11: Concentration of people can encourage social connection and public safety.

Modernist idea #12: Home and land ownership is the key to community.
Existential idea #12: Easy social contact is the key to community.

Modernist idea #13: Places should closely fit their specialized functions.
Existential idea #13: Environments should be easily converted to new and multiple uses.

Childress finds that the inventory of spaces in American high schools has been the same for generations. They include classrooms, hallways, lockers, toilets, gym, auditorium, cafeteria, band room, janitor's room, and labs for science, fields, parking, and nowadays a computer lab. Once the numbers of students are known, we can apply this to Architectural Graphic Standards or state guidelines. "The list of spaces and its associated geometric and financial arithmetic is what the design is based upon, what the school district expects and the architects provide. It can be done in its most basic form in half a day" (p. 214). His notion is that living with and accepting a certain mental model and beliefs for what a school is make the ensuing experience almost inevitable. We therefore shortchange our kids, refuse to construct anything innovative and through our landscapes betray our children and deprive them of places they truly can enjoy (p.214).

Interest and Motivation

"No topic has received more attention from pedagogical writers than that of interest."
William James

In the field of interest and motivation, the unpublished work of Art Powell (unpublished) is the most extensive and expansive the researcher has reviewed. In a review of Powell's text and the accompanying bibliography, there is little specific information on school design that is developed explicitly around interest and motivation. Powell carefully constructs his definition of interest as those interests that endure and are intellectually powerful. He is not talking about cultivating the interest of being a baseball fan or watching television as an intellectual pursuit. He is interested in the arts, athletics, science, literary, and applied disciplines not as an estrangement from intellect but, rather, as interests that have an affinity to intellect. Powell also analyzes the difference between intrinsic and extrinsic interests and motivations. Learning environment factors, such as a richness and availability of materials and tools, small numbers of students in classes, the use of mentors, and experiences on the outside of school, appear in many of the references (Bloom, 1985; Cremin,1961; Dewey, 1913; 1975; Sarason, 1990).

Many of the studies on interest and motivation reviewed actually point to a negative influence of the traditional school environment on the development and pursuit of both intrinsic and extrinsic interest (Bloom, 1985; Csikszentmihalyi, Rathunde & Whalen, 1993). Cremin (1975) discusses how schools should be more like community centers that support the interests of students both during the school day and after school. The school should be more connected to the community and to the family. He believes that a school's facilities should remain open to the community day and night. Cremin makes no mention of whether there are rooms set aside for these community activities or if these rooms are reutilized for different activities at different times of the day.

The student-to-teacher ratio in Dewey's Laboratory School in Chicago was 7:1 (Cremin, 1988). This ratio allowed teachers to engage each student around that student's interest. It was noted by Cremin (1988) that the school received support from many of Dewey's influential friends in Chicago. Furthermore, most of Dewey's students came from well-educated families (Cremin, 1988). Zilversmit(1993) points out that most of Dewey's pre-occupation was with the quality of the teachers at the school and not the design of the school or the classroom.

Eliot was focused on students finding, "their natural bent, or preference" (Eliot, 1898, p.11). Education helped students discover what they were good at through their interest (Hawkins, 1972). These practices were developed at Harvard by Eliot through his elective system. This system allowed students to take a variety of courses. Eliot wanted to see the expansion of the elective system into high schools, but felt these electives should be the type usually associated with the liberal arts. Eliot wanted to provide students with choice. He wanted to gradually expose high school students to the liberal arts, and then offer students more choice about what they wished to study more seriously.

Eliot took a hard stand on tracking students into commercial or vocational avenues. He believed that these tracks sorted students for life, long before their "capacities and possibilities" could be discovered (Eliot, 1961 [1899], pp. 123-134). To Eliot reducing pupil-teacher ratios was a way for teachers to have more time to get to know individual pupils and understand who they are. Discovering the "gift or capacity" of each student, he once wrote, "should be held one of the most important parts of the teacher's work" (Krug, 1964, pp. 109, 127).

Interest did not really equate to environment but more too developing personal relationships in a classroom or lab. References about the school or classroom design hindering or enhancing learning do not appear.

Csikszentmihalyi (1993) discusses activities in which people operate in the zone-- a phrase he invented that describes a state of enjoyment people experience when doing things they like to do. According to his research, adults reported that one of the times they are in the zone is while reading (25 percent of adults reported being in the zone when they read), but this does not mean that schools should only create environments in which students should read. Csikszentmihalyi (1993, p. 148) agrees that learning should be interesting and should appeal to student interests. . But he warns that student interests are too often "simplistic and superficial," and he concludes on a note his colleagues would surely endorse: "We educators still have much to learn about how to make learning intrinsically rewarding" (page 148).

Csikszentmihalyi et al., (1993), and Arnold (1994) suggest that intellectual talent and interests continue to develop when children leave the household and join groups or are coached. Parents play a supportive role in enabling and encouraging these interests. Much of the talent development research emphasizes the environmental factors that are responsible for such development of talent. The literature focuses on what can be done to arouse, nurture, and reinforce talents or interests and about what education can do. Specifically, the literature is primarily about contributions of the home, on the one hand, and schools and teachers, on the other (Powell, unpublished).

Bloom (1985) and Winner (1996) believe that schools are weaker influences than families on developing student interest and talent. Their findings show that schools make little positive difference in interest and talent development. Most students develop serious interests and talents outside of school even when the same students like and do well in school. Their findings also show that individual tutoring is far superior to class instruction. Bloom's work (1985) on very talented individuals demonstrates the importance of the tutoring and coaching on developing talent. Students studying to be classical musicians, Olympic caliber athletes, or scientific researchers often establish intense tutorial relations with teachers who have national reputations. Many of these teachers and coaches work outside the regular school and university system. Wilson (1997) and Hillman (1996) continually point out that many children pick an interest and a mentor before their adolescence. Csikszentmihalyi (1993) adds that mass education "interferes with the cultivation of unique skills" (p. 149). Through his beeper methodology, he discovered "that talented

student, inside school classes, was generally uninterested in the substance of the classes and more interested in daydreaming, talking with friends, or falling asleep" (p. 180).

These studies conclude that the structure of school does not cater to individual interests, and neither does its physical environment. The organizational space is the classroom and the class, not the individuals with their own personal tools or space. Students are using learning environments outside of school to develop their interests and talents.

In *Public Education* Cremin (1977), points out that schools should not get all of the blame when students don't learn, but they shouldn't get all of the credit for learning either. In fact, Cremin's case studies (1988) of Americans showed how rarely schools had an impact on the lives of these people, many of whom were avid readers. This interest in learning and reading, according to Cremin, almost always started in the home. The research on interest suggests that schools are actually having a negative impact on talented students and on developing student interest in matters that such schools normally receive credit for developing, such as reading interest. The environment that schools establish and the practices and pedagogies in place are not conducive to the development of interests or talent. This fact is manifested in the programmatic, pedagogical, and physical design of schools. Although schools may have pools, labs, and art studios, there is little opportunity for tutorial or independent work during the school day when student and faculty schedules are organized around classes.

Motivational psychologist Deci (1991) is not interested in the environmental component, nor does he believe that schools can be places in which enduring interests are developed. He argues that, in most settings, a teacher does not have the capacity to delve into individual interests of children under available environmental conditions. What he does believe is that students should be given a wide range of choices about what should be learned and an abundance of parental and peer support. Deci argues that "enduring interests" develop as a function of three critical factors: innate capacities, financial support, and interpersonal contexts. He states, "People tend to have stronger preferences (or dispositional interests) for activities at which they are more competent or have greater potential" (p.330). The environmental factor is similarly evident. Available opportunities, such as the possibilities contained in one's family, culture, or geographic position, make certain interests more likely and others less likely.

Powell's (unpublished) work points out that most motivational and interest driven psychologists believe that schools are organized around extrinsic rewards and actually negate much of what could be done to foster interests in youth. The programmatic and physical design of schools would not positively impact a student's developing interest, because the school system is geared up for grades and reaching standards. To develop interests, it is more important for students to be with people who serve as mentors in one-on-one situations and to be placed in real-world settings. In conclusion, Monet (Morgan, 1996) said a great deal about interest and passion when he stated, "My studio! But I never have had one. I don't understand why anyone would want to shut themselves up in some room. Maybe for drawing sure; but not for painting" (p.77).

The most important learning signature of the Met is for each and every student to follow their interest, one student at a time in a community of learners. At the Met, each student's curriculum is developed as a learning plan and starts with their interests. In reviewing the literature on interest, it is apparent that a different environment is needed for students to pursue their interests. They need mentors in the real world to learn from. They need to use the real tools that their mentors use. They need to be in places that are sophisticated enough to allow them to pursue their interests in meaningful ways. They need to have conversations about their work to develop a sophisticated vocabulary that allows the understanding of nuance. In Wilson's book, The Hand (1998), a case study of Chef Reed Hearon sums it up beautifully with Hearon stating, "I'm a firm believer in the idea that if you read two books on a subject written by knowledgeable people you will know more than 95% of the people in the entire world about that subject. To learn enough to equal the other 5% will take you the rest of your life. (p.236)."

School facilities also need to adapt and be flexible so each and every student can pursue their interests. A new set of design principles both programmatic and physical are needed to promote the development of interest-based learning. It is the translation of these physical principles in a facility that provides education with such a perplexing issue.

Career and Technical Schools

"In the early years of this century, John Dewey warned educators to beware of setting up a false dichotomy between 'head' and 'hand.' He called instead for situating learning in the vocations of adult life" (Steinberg, 1998, p.8).

Starting in 1992, George Copa worked closely

with the National Center for Restructuring Vocational Education (NCRVE) to produce a process and a set of principles that would guide the design process of the 21st Century high school (Copa & Pease, 1992). The NCRVE was interested in the changing role of vocational education to see how all high schools could reform themselves to have a career and technical component so that high school students could get real world experiences, regardless of whether they were college bound or about to enter the workforce after high school. According to Larry Rosenstock (Adams, 1995), "only 27% of today's 'voc. ed.' graduates will ever be employed in the narrow fields they have pursued in high school and that most of those face limited prospects in dead-end jobs."

Copa and Pease identified several characteristics of vocational and comprehensive high school education, among them the integration of high-level academic education and modern vocational education for all; partnerships with parents and families, business, industry and labor, community-based organizations, and other schools to diversify learning settings; plus make education up-to-date and learning more meaningful.

Copa and Pease proposed, as a response to the NCRVE Report, that schools be redesigned into new career academies or break into smaller units. One example of such a redesign was the Rindge Technical School for the Arts. Rindge is the tracked vocational house of Cambridge Latin, the only public high school in Cambridge, Massachusetts. In the ninth grade, students are enrolled in the CityWorks curriculum, and in the tenth grade, they are enrolled in the Industries curriculum, , in which students plan and set up small businesses in design, construction, communication, transportation, and food industries. During the eleventh and twelfth grades, student-learning shifts to two paths in the program called Pathways. School-based enterprises included computer repair, vehicle conversion services, and the building of tabletop devices to illustrate scientific principles in physics. In work-based enterprises, students worked and learned in day care centers, as classroom aids in hospitals, and at Polaroid Corporation (Copa, 1994).

What Rindge Technical School for the Arts did was change its curriculum and then redesign the interior space of the building. David Stevens, the coordinator of the CityWorks projec,t was also a trained architect. He redesigned the space in the ninth grade CityWorks project to resemble an architect's studio. There were spaces where projects could be stored, small meeting rooms, and conference rooms, space where projects could be kept out for long periods of time, and there was learning built directly into the building in the form of scaled paintings of the map of the city of Cambridge and the infrastructure patterns of streets and lights. At one end of the room, there was also space for presentations and exhibitions (Steinberg, 1998).

At the beginning of the CityWorks program, no one knew quite what to do with the space. Students wandered about and staff had many meetings to attempt to discover what learning would happen in this environment. Over the years, the design of the CityWorks space started to work as the program took shape. The success of this room led to the next step in the evolution of the Rindge curriculum, creating the tenth grade Pathways program where emphasis shifts to more independent work and teamwork, based upon the students' development of micro-enterprises where students get out more into the world.

Principal Larry Rosenstock left Rindge in 1997 and became the project director of the New Urban High School. He took educator/architect David Steven from his Rindge staff with him. This project, funded by the United States Department of Education, Office of Vocational Education, studied five urban high schools: Central Park East Secondary School in New York, Hoover High School in San Diego, Chicago Vocational School, Turner Career, and Technical School in Miami, and St. Louis Career Academy. The Metropolitan Regional Career and Technical Center (The Met) was the lab school of this project. The findings suggested three principles for the design of the New Urban High School. They were personalization, real-world learning, and intellectual capital.

Although there is mention of programmatic changes, there is no emphasis on the physical design of these schools. Most of these high schools were very large urban schools with the exception of Central Park East and The Met. Hoover High School and Chicago Vocational School had broken themselves down into smaller units but there was still a strong sense of being part of something big and not of being part of something small.

This further evolution of the career and technical school is now manifested at High Tech High, in San Diego, where Larry Rosenstock and David Steven (High Tech High, 2001) continued their work and created a 9-12 charter high school. The design elements of the New Urban High School were used for the programmatic and physical design of High Tech High. The school opened for the 2000-01 school year with a ninth and tenth grade. There has not been any research on the design, but there are promising features of smallness and intimacy, as well as real-world learning through labs set up at the school with the most advanced computer systems.

Small Schools

> "Less is only more when more is no good."
> Frank Lloyd Wright.

"The President's Science Advisory Committee panel is probably the most far-reaching in its recommendations when it proposed that high schools be made smaller and more specialized, that students be permitted to attend more than one such specialized school, simultaneously or seriatim, and that schools themselves experiment with ways of becoming agents for their students in arranging for appropriate education outside of school (in business, for example, or in child-care centers or in museums)" (Cremin, 1976, p.64). This recommendation by the United States Department of Education has been echoed over the past 25 years. Still, most of the high schools in this country are large and impersonal.

Historically, the seminal works of Conant (1967), that supported large high schools, and Barker and Gump (1964), that advocated for smaller high schools, are the two key studies referred to in discussions regarding the merits of large and small high schools. Most public school policy makers followed Conant's viewpoint even when research demonstrated that, all things being equal, students learn more in smaller schools (Fowler, 1992). Lee and Smith (1994) used data from the National Educational Longitudinal Study to show that small schools were found to increase teacher collaboration and team teaching. "Large size and fragmented human contact complicate the management of such schools, which elevates the importance of formal rules to regulate behavior. Lee and Smith found that "the environment in comprehensive high schools is therefore less human" (p. 2).

Ted Sizer (1985) believes that schools of 400 students can offer a curriculum that compares quite favorably with the curriculums offered by larger high schools. Sizer believes that "less is more, thoroughness counts more than coverage" (p. 223). The studies done on gender and race issues also point to the important role of small schools. *The Report Card on American Education* (1994) reported that higher outcomes on standardized tests, such as the S.A.T. and the A.C.T., as well as higher rates of graduation, may be connected more with school size than with race. The study also found that school size, not classroom size, was the key in the performance of students. Children did better in schools where the principal knew the names of the students. Schools with fewer than 300 students showed the best performance, even though class size was higher than the national average. Robert Crain's (1986) study of high schools concludes that "size is of critical importance in black schools, so much so that reducing high school size should be the highest priority in cities serving large black populations" (pp. 36-37). However, Oxley (1989) points out that the issue isn't whether small-unit organization is effective but how to implement such organization fully and faithfully. She believes that the implementation of transforming a large school into a small one or a reorganization of the program of a small school into a blend of new and old practices is a difficult change to make.

The Public Education Fund (Klonsky, 1994) in its executive summary states that the premise that small schools are more expensive to operate has always been false.

> Rather than economies of scale, the researchers found penalties of scale. Difficult to manage efficiently and safely, large schools require a disproportionate increase in management; an extra 'layer' of managers - subject supervisors, assistant principals, deans, additional secretaries - separates principals and teachers. (p.1)

Furthermore, this report points to ways that the costs of acquiring land, designing, and constructing small schools can be cost effective. These recommendations include greater flexibility in site acquisition, renovation of existing abandoned and underutilized buildings, and collaboration with other public agencies to incorporate small schools into multiuse facilities.

Walberg (1994) found a parallel between growth in school size (400 percent since 1940) and per-student spending (500 percent since 1940) and concluded that "education in the United States clearly shows what economists refer to as 'diseconomies of scale,' where increasing size results in an increase in per unit costs" (p.4). Much of the discussion around the physical space in the literature on small schools argues that building small schools will produce safer schools and better places for students to work with adults who know them and whom they trust (Wasely, 2000; Nathan, 2001).

Deborah Meier, a small schools advocate, has designed a small high school from a warehouse in the South Bronx (Washor, 1996). The Fannie Lou Hamer School has design features that accommodate small groups of students gathering in clusters for their work and as a community of learners. The building's design is used to help break up and make the whole school even smaller. The smaller houses of the whole school

are separated by meandering corridors where students from one group would have little or no contact with students in another part of the building. All classes are kept in each cluster, and the cluster can meet as a whole group in an area to which the cluster of rooms opens up. Still, most of what has been designed is focused around breaking up a small school into smaller units. There is little attention to the design based on the practices in the school, and consequently, classrooms and labs look as they would in any traditional school. Tables may be arranged so students can work together on projects and meet in small groups, but that is the extent of the design change in the classroom.

When architecture enters into the picture of small schools research, it is usually around two issues (Wasley & Fine, 2000):

- The flexibility of where small schools can be built (e.g., on small pieces of property, in offices, and old warehouses).
- The transformation of large high schools into a series of small high schools (the multiplex small schools are safer because the students are closer to adults they know well and trust).

The limited references to the physical design changes around pedagogy show little thought going into how the environment affects learning. In this latest work of Wasley and Fine (2000), which summarizes and reviews the latest research on small schools, their findings show a propensity to think about relationships of adults and students, but not about what interior environment would be conducive for these relationships. Their findings reveal a lot of thought around penalties of scale in large schools, but it is unclear in their research if the buildings they refer to have layouts similar to those of larger schools. In addition, there is little evidence of translation of pedagogy into design of the learning environment.

Nathan (2001) highlights 23 small schools from around the country as case studies. In reviewing each school, Nathan focuses on many special features they have in terms of their architecture. Upon review of this portion of the study, it was found that comments concerned the following treatments:

- Multipurposing and sharing pre-existing space like YMCAs and after-school centers. Schools would use the space in the daytime.
- Creating new spaces to accommodate mental health facilities. El
  Puente
- Changing large high schools into six small schools. The Julia Richmond model converted a 5,000-student high school into 2 small high schools, 2 middle schools, an elementary school, and a daycare center.
- Giving each student a personal workspace. The New Country School in Minnesota High Tech High and the School for Environmental Sciences all students have their own desk, files and computer in a large open area.

In Peter Senge's landmark work, *The Fifth Discipline* (1994), a theory is put forth about how our mental models shape our behavior and attitudes. These mental models are carried in our minds, other people, and every aspect of the world (Senge, 2000 p. 67). Usually mental models exist below the level of awareness and are often invisible to us. They are often untested and unexamined. It is these mental models that constrain our thinking and as Senge points out our ability to act differently. It is in mental models where much of the literature review shows a lack of ability to question what already exists and to proceed in the framework of the existing model, thereby blocking the advancement of the translation of educational designs into educational facilities.

The architects, educators, bureaucrats, community, construction companies, school boards, and the public all fail to put many new insights into practice because "they conflict with deeply held internal images of how the world works, images that limit us to familiar ways of thinking and acting "(Senge, 1994, p. 174)." There is no citing of the discipline of how to manage mental models through Senge's "surfacing, testing, and improving our internal pictures of how the world works "(p. 175)." On the contrary, throughout the review, there are systems and bureaucracies in place continuing the existing way things are always done which prevent new school designs to be translated into new facilities.

One recent example of this mental model phenomenon in small schools is a study done by architect Steven Bingler on the economies of scale of small schools. In his study, Bingler researched award-winning schools over the past five years, both large and small. He found that when he analyzed building costs by cost-per-student, based on the data for all 489-school facilities in the study, the median cost-per-student was $12,777.78 for small schools and $12,959.49 for large schools. The average cost-per-student was $15,674.01 for small schools and $14,516.04 for large schools."
Bingler goes on to state:

> Even when comparing only the immediate capital costs separating the small and large school projects listed, it is compelling to note the relatively small

> difference in median (1.5%) and average (7.5%) costs/student for construction. These numbers are especially important in light of the documented evidence presented in other places in this report indicating the considerable advantages that may be available with small schools for increased student achievement and performance. Especially in cases where smaller schools may prove to be more expensive than their larger counterparts to build, the decision to limit school populations can require more than an average measure of economic analysis and personal courage (p.3)

The data demonstrate that the economy of scale argument is weak when looking at cost per student and achievement, but large schools are still being built because it is hard to get beyond the mental model of school.

Summary of the Literature Review

The review of literature and research focused on five major areas related to the Met's design elements and to the two major research questions:

1. What were the forces at work in translating an innovative pedagogical design and organizational school design into a facility?
2. How do prevailing concepts and processes of school facility design accommodate the translation of innovative pedagogical and organizational designs?

School Facilities

Three themes emerge from a review of research and literature on school facilities design. First, facilities designs have been shown to have an impact on learning. Second, these designs have been shown to have an impact on students and others who work in the schools. Third, there have been few innovations in school facilities design. All three of these themes were examined in this research. The social, economic and political factors and forces at work impeding facilities design innovations are clearly entrenched in the respective fields - of education, architecture, construction, government, and politics. They are manifested in a quest for economies of scale, the over-regulation of building facilities, and the heavy reliance on the traditional mental model of a school.

Learning Environments

There are many researchers, architects, and educational planners who have developed design process plans and theories about what schools should be in practice and what their facilities should have, but they have few schools to show for all their writings.

The learning environment research abounds with articles on climatic conditions such as adequate lighting and air quality. These facilities planners and architects speak and operate with specialty languages and building codes for school design that do not address translating pedagogical designs into facilities. On the contrary, many of these regulations prove to be a barrier to change.

At the turn of the century Dewey, Wirt, Montessori, and others were keenly interested in the school's learning environment and designed schools based on their innovative philosophies and practices. Some of these translations have withstood the test of time in their own niche of private schools, but they have not affected the present public education system on any scalable level.

Three of the four schools that have successfully translated pedagogical designs into facilities --Montessori, Regio Emilia, and Eagle Rock-- are private schools. Both Montessori and Reggio have successfully replicated their model. The fourth school, The Apple Valley School is a specialty alternative school that has not replicated itself as a model.

Most school systems accept the mental model of a school and use economies of scale as a justification for the processes used to design and build schools. The districts refuse to construct anything innovative and through these old school designs betray our children and deprive them of places they truly can enjoy (Childress, 2001 p. 214).

Interest and Motivation

The research on interest and motivation strongly suggests the need for schools to adapt and be flexible, so each and every student can pursue his/her interests. In the area of interest and motivation, schools are not programmatically set up to educate students by allowing them to pursue their interests. Educators and psychologists raise serious questions about whether what is being taught in school is learned. It is also affirmed through the research that children are learning much more outside of school than schools are getting credit for, including reading. A new set of design principles, both programmatic and physical, are needed to promote the development of interest-based learning and the education of children. How to translate design principles based on interest and motivation into a school facility is a perplexing issue.

Career and Technical Education

Most of the recent research on the translation of complex pedagogical designs into innovative facilities is coming out of the career and technical arena. Included in this movement are researchers such as Copa calling for all high schools to transform themselves into career academies and learning communities. Thus far, there are few examples of schools that have transformed and sustained themselves. There is some evidence that a few new schools, such as High Tech High and the Met, are translating complex programmatic designs into facilities.

Small Schools

The research on small schools and facilities design is scant. There is even evidence that these researchers are not very concerned with facilities, because funds for facilities compete with funds for small school programs. Funds for creating small schools, not their facilities, are what small schools advocates are really interested in.

The argument for economies of scale is still a barrier to building small schools. It is only recently that architects and educators are trying to develop an argument for the economies of scale of small schools (Bingler, unpublished). Furthermore, there seems to be a disconnection between the language small school reformers use and the language that architects and bureaucrats use.

Figure 1 depicts the convergences, crossovers, and disconnection between the five areas researched. It portrays the complexity of the relationships between the different areas and in general the complexity of the system to translate pedagogical designs into facilities. This figure brings the five areas of study undertaken in this literature together. By combining the summaries from each area of study with the chart, the following major issues and forces at work appear:

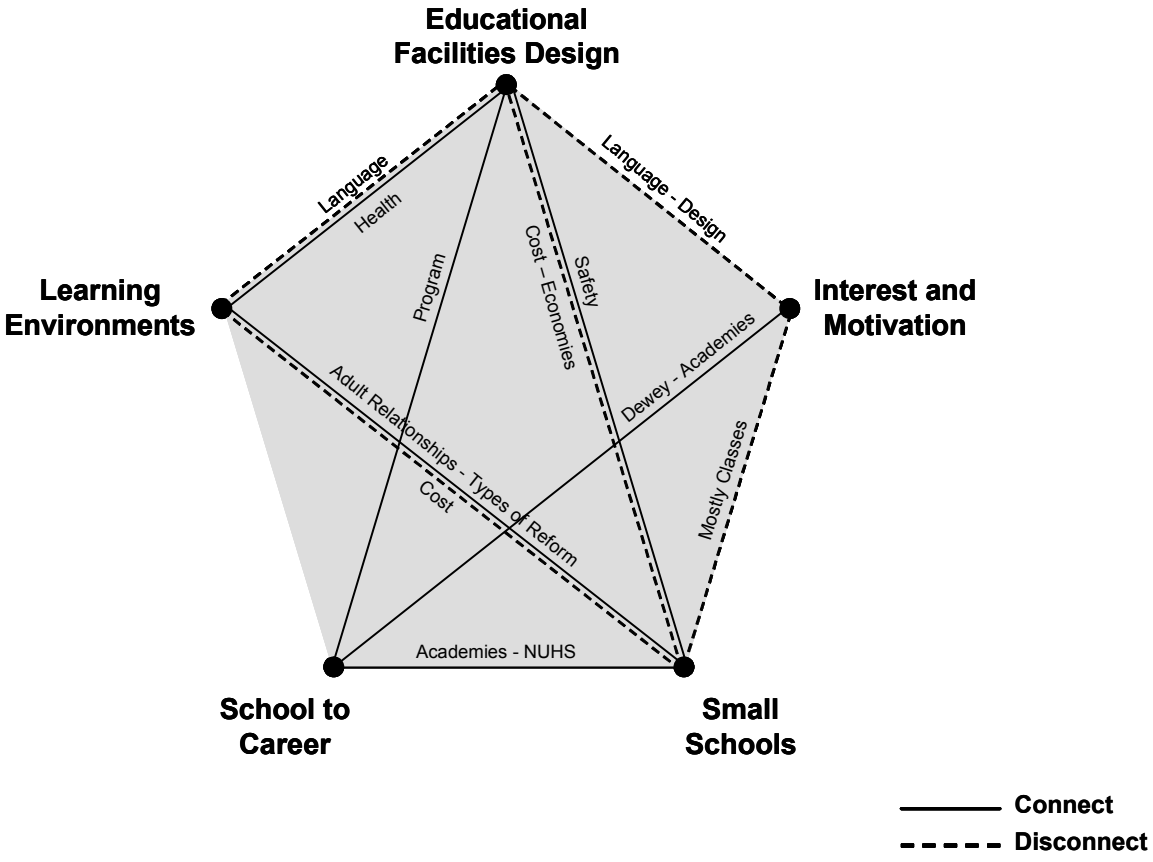
- Different "languages" are spoken by the different professionals.
- Competition for similar funds causes a lack of collegiality.
- There is a lack of familiarity with the processes of each area of study to design schools.
- There is a lack of sustainable or replicated(?) designs.
- Strong bureaucracies are in place regulating the process and selection of school designs.
- The major economic force for building schools is still economies of scale for large schools.
- Professionals and researchers in the five areas rarely read or communicate with one another. Each has their own way of approaching a problem.

Even though all of these issues exist, the review of the research shows a small but growing trend towards small schools. The school facilities designers, learning environment researchers, psychologists studying interest and motivation, career and technical educators, and small schools advocates are all moving programmatically toward small schools. The research shows that there is interest in translating these programs into facilities, but very few facilities have been built that carryout the program design into facilities.

Finally, it is interesting to note that the Met is the only school that connects to all of the five areas in the literature review.

Figure 1

Educational Facilities Design: Relationships between Constructs



III. RESEARCH METHODOLOGY

This chapter describes the research design and methodologies used to address the research questions. Data sources, methods of sampling, instruments, data collection procedures, and analytic strategies are explicated. Limitations and delimitations are discussed, including procedures for obtaining high reliability and validity of the findings.

The nature of the research questions and the dynamics (number and complexity) of their interactions requirea qualitative design. Multiple data sources and data collection methods contribute to reliability and validity.

The research addressed two major questions and several subsidiary questions:

Research Question 1: What are the forces at work in translating an innovative pedagogical and organizational school design into a facilities design?

Three specific questions were examined as they related to this major research question:

1.1 What are the key factors that support or impede the translation process?

1.2 What are the dynamics of the relationships between the numerous constituencies involved in the process for designing and constructing schools and how do these dynamics affect the translation process?

1.3 What aspects of the Met program pedagogical design are viewed as essential by those constituencies?

Research Question 2: How do prevailing principles and practices of school facility design accommodate the translation of innovative pedagogical and organizational school designs?

Three specific questions were examined as they related to this major research question:

2.1 How does the Met's program design align with prevailing ideas of school architecture and construction?

2.2 How well do prevailing school facilities design processes accommodate the essential Met program design components?

2.3 What aspects of prevailing school facilities design processes impede or facilitate the translation process?

Research Design

The research employed qualitative methodologies in an in-depth case study of one high school's facilities design process (Yin, 1994). The Met facilities design process constituted the "the single unit or bounded system" of the study (Smith, 1978, p22). These methodologies allowed for addressing the research questions through description, understanding, and explanation of a phenomenon (Merriam, 1998). "Qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world" (Merriam, 1998, p. 6).

The research was conducted in two stages. Stage 1 included a detailed literature review and analysis, which continued throughout the research and then integrated into data analysis. Also in this stage, the researcher interviewed and consulted with several national architects and school facilities designers (see Appendix A) in order to validate the research questions and to identify specific variables of interest related to those questions. The outcome of Stage 1 activities was a specific list of variables that were used to derive interview questions.

Stage 2 consisted of in-depth interviews, participant observations, site visits, and document reviews. The use of multiple data sources and multiple methodologies was intended to increase internal validity and reliability.

Data Sources

Data sources for both major research questions included key informants, events, and documents. Key informant groups included architects, educators, state administrators, contractors, and students. They were selected because of their ability to offer a perspective on the topic being studied (Miriam, 1998). Over the course of the research, several new informants entered the process and were included in the research. These additional informants were identified through a cascading process in which subsequent informants were identified in interviews with the original list of informants.

Events included facilities design meetings, community meetings, construction meetings, observations of selected small and innovative high schools located throughout the United States, and meetings of the Minority Business and Women Business Enterprise.

Documents analyzed for this study included minutes of meetings, correspondence, newspaper articles, and program and facilities design documents. Documents also included minutes of Minority Business meetings, architect selection, construction manager

selection, site acquisition, the Met Feasibility Study, the Met's weekly newsletter (the TGIF), Big Picture Staff meeting minutes, Minutes from State School Committee meetings, RFPs for land acquisition, architect selection and construction manager selection, articles from the Providence Journal, Feasibility studies by Robinson, Green and Baretta and the Big Picture Company, and the original programmatic design produced by Educational Consulting Services. In addition, the researcher maintained a journal of his observations and reflections during the process.

Instruments

The principal data collection instrument used was an interview protocol (Appendix B) that was customized for each of the key informant groups. The protocol of core questions was developed in conjunction with the original list of architects and designers to align with the major and subsidiary research questions. Seymour Sarason then reviewed the questions for their appropriateness in addressing variables related to pedagogical design. Stephen Bingler reviewed the questions for their appropriateness in addressing variables related to school facilities design. The interview questions were revised and expanded during successive interviews with the key informants. Questions ranged from hypothetical, ideal position, devil's advocate, and interpretive (Strauss, Schatzman, Bucher, Sabshin, 1981).

Data Collection

The research used multiple data collection processes to address the major research questions. Data collection methods included interviews, participant observation, and document analysis. In addition, time was spent at every design meeting observing the interactions of all participants in the design process. There were also numerous follow-up conversations with the many engineers, architects, staff representatives ? from the state department of administration and thestate department of education, members of the community, and politicians.

The researcher used personal journals in field notes to recall and analyze observations about meetings and design iterations. These notes helped the researcher to contextualize and validate data obtained through interviews and document analysis.

All interviews were conducted using a standard interview protocol. Participants were contacted by telephone prior to the interview in order to establish a meeting date and time in to review the interview questions. On the day of the interview, each participant reviewed and signed the disclosure form prior to the interview. Most interviews took between 30 and 50 minutes; a small number of interviews exceeded that time. Although the researcher knew all of the participants professionally, he employed a professional disposition during interviews and encouraged open and candid responses to the interview questions (Fowler, 1993).

"There are five aspects of interviewer behavior that researchers attempt to standardize: the way they present the study and the task; the way the questions are asked; the way inadequate answers are probed; the way answers are recorded; and the way the interpersonal aspects of the interview are handled" (Fowler, 1993, p. 107). The researcher took the necessary license to probe when responses triggered a further elaboration of answers.

The researcher collected and analyzed data from the minutes of the facilities meetings and community meetings, and from design charettes. He also reviewed the design plans and the entire Met project.

The researcher employed participant observation in all design meetings. The researcher was a complete participant (Gold, 1958) in the design process. He represented the Met on the Met facilities design team. Detailed minutes and reflections were prepared for each meeting.

Interviews were conducted in waves followed by analysis, and additional interviews of key informants continued until data saturation was achieved. Interview data was tape-recorded and an interview log was completed for each interview (Miriam, 1998). Additional interviews were conducted to verify and further elaborate on specific patterns and themes until saturation was achieved.

Observation notes and document analyses were conducted to triangulate on key variables that emerged. The researcher has collected extensive information from all design meetings since the inception of the facilities design process in 1996. All documents were analyzed in light of the research questions.

The researcher interviewed other educators and architects who believed their programs translated complex pedagogical designs into facilities. Their programmatic signatures were identified, and they described the physical features of these learning signatures. What were the manifestations of their program? What were the problems they had in translating these designs and with whom? Although the Met and other designs of schools studied were atypical cases, they were chosen because they are not so much atypical but rather innovative and therefore atypical. Abramson (1981, p.190) impresses upon us the value of unique or atypical cases. "First, since such

data are rare, they can help elucidate the upper and lower boundaries of experience. Second, such data can facilitate predication by documenting infrequent, non-obvious, or counterintuitive occurrences that may be missed by standard statistical (or empirical) approaches."

Because the researcher is an active participant in several national networks dealing with small innovative high schools, he was able to identify a small number of schools similar to the Met. Through meetings at conferences and through telephone conversations, the researcher arranged visits to these schools.

- MetWest - Oakland, CA
- Truman High School - Federal Way, Washington
- University Preparatory Academy - Detroit, Michigan
- The Rhode Island Training School – Cranston, Rhode Island
- Eagle Rock – Estes Park, Colorado
- Reggio Emilia – Reggio, Italy

The site visits were useful for observing how other similar schools addressed facilities design issues. By linking the probing interviews with actual observations of key design elements, the researcher was able to validate others' perceptions through on-site examination. This was particularly valuable in responding to research question 2.0. The researcher maintained extensive field notes from each site visit.

Data Analysis

Field notes, meeting notes, researcher journals, and interview transcript data were analyzed using qualitative methodologies (Miles & Huberman, 1994). Transcript data were analyzed in successive waves and each succeeding set of interviews built on previous analyses. The analysis focused on a convergence of a few dimensions that appeared to best illuminate the dynamics of the design process and provide the best support for high internal validity and limited external validity.

Specific field notes were taken after each interview to record date, lengthof time, and the participants' overall attitude toward the interview (Bradburn, Oppenheim, 1992; Sudman & Associates, 1979). Data was then analyzed for common patterning, clusters and themes (Huberman & Miles, 1994). Data was identified and sorted, and categories were developed. Initial data analysis identified 43 categories. Fink and Kosecoff (1998) suggest it is easier to combine categories later as opposed to trying to separate them after they are combined. Further data analysis identified possible grouping and lead to a reduction of 19 categories.

To guard against bias, the researcher frequently shared interview summaries and meeting analyses with key informants to check the accuracy of the analyses. He had a small selection of his transcripts independently coded in order to check the accuracy of his coding. He also triangulated his analyses of interview notes with his analyses of the documentation to assure congruence.

Themes from the data emerged through successive waves of coding and analysis. Coding of the initial series of interviews revealed a preliminary set of patterns that guided subsequent interviews. These patterns were then checked against the documentation and field notes. The final set of patterns was derived from a holistic examination of the coding from all sources.

Data analyses also included an examination of the relationship between the two major research questions. Data regarding interactions were hypothesized, based upon evidence of the tensions between architects and innovative educators.

Limitations and Delimitations

The research was potentially compromised by issues of reliability and validity in data collection and analyses.Qualitative research is commonly threatened by researcher bias and inadequate sampling of informants or events. To address these challenges, the researcher employed multiple methodologies and multiple data sources focused on a select set of variables. The potential for bias inherent in participant observation was balanced by interviews and document analyses to ensure a robust triangulation on the variables of interest.

During the time period of the study, the researcher served as co-principal of the Met school and as the school's representative on the school design team. As such, he served as a participant observer for much of the study. To guard against possible bias in data collection and analysis, the researcher employed independent coding and key participants' review of the accuracy of meeting summaries and field notes.

As in most qualitative research, external validity is limited to the match between the particular research setting and other external settings. While the Met design is highly innovative and atypical, its particulars do not compromise substantially the ability to generalize to other situations in which facilities are designed to accommodate highly innovative educational designs. It will be up to the reader to decide if the political, organizational, financial, social,

and educational circumstances are sufficiently similar to justify transference to other settings. As Cresswell (1994) explains, "the intent of qualitative research is not to generalize findings but to form a unique interpretation of events" (p. 158). Merriman (1998) and Janesick (1998) confirm the goal is not to make broad generalizations to other schools, but rather understand the processes of one study.

IV. FINDINGS

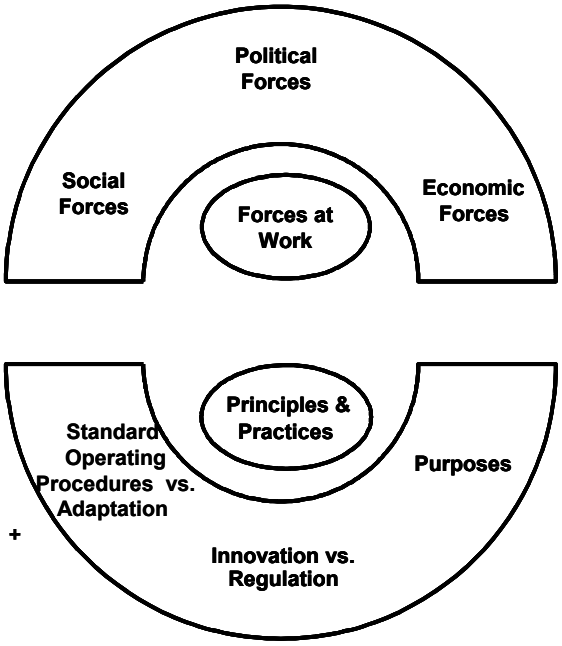
The study findings are presented and analyzed in four sections. The first section presents a brief history of the design and construction of the Met campuses, including a timeline of major events. This history provides an overview of the detailed and dynamic complexity of the process over time. The second section provides a brief description of each of the schools that were visited or reviewed as part of the research. Findings from the history and the school sites were incorporated into the presentation of findings regarding forces at work and architectural design principles and practices, in sections three and four respectively.

Section three addresses the first major research question: What are the forces at work in translating an innovative pedagogical and organizational school design into a facilities design? The findings are organized and analyzed in three areas: political, social, and economic. Specific sub-questions are also addressed.

Section four addresses the second major research question: How do prevailing principles and practices of school facility design accommodate the translation of innovative pedagogical and organizational school designs? The findings are organized and analyzed in four areas: purposes, innovation vs. regulation, flexibility vs. durability, and standard operating procedures vs. adaptation. Specific sub-questions are also addressed.

The data was analyzed by identifying the predominant patterns and themes resulting from all data sources for each research question and sub-question. Figure 2 depicts the interaction of forces at work and tensions impacting the translation process. Data analysis identified three forces: economic, political, and social. Additionally, three major tensions were identified: 1) innovation vs. regulation, 2) purposes and 3) standard operating procedures vs. adaptation. It is the combination-- of these forces at work and tensions with respect to prevailing principles and practices-- that describes the way in which highly innovative pedagogical designs are translated into school facility designs.

Figure 2
Interaction of Forces at Work and Tensions Impacting the Translation Process



Themes and patterns were identified by comparing and analyzing recurring concepts in the data collected from the literature review. This included the various constituents' reflections regarding their understandings of the design process, considering the Met's philosophy and pedagogy in the translation process. These constituencies included architects, bureaucrats, community people, members of the Met community – parents, students, politicians, and directors of the schools reviewed for their design.

These forces at work are not independent of one another. It is difficult to isolate and cull out data that is uniquely related to only one of them. There is interplay between the forces that creates tensions in the work of translating pedagogical designs into facilities and makes the translation enormously complex. This interplay is addressed specifically in the final section of this chapter.

History of the Met Design

The research on facilities design and construction points out that the average time it takes to build a school from conception to completion is seven years (CEFI, Lackney, and Tate). The following account chronicles the key events in the history of the Met facilities project in order to bring to light the issues in designing and building a school that either hinders or supports the translation of complex pedagogical designs into facilities.

Eight years (1994-2002) transpired between the passage of the bond issue by the voters of Rhode Island for a new Career and Technical school and the start of construction. In reviewing the literature and the data, the history of this project through the passage of time in and of itself stands out as a factor in the translation of school program to facility. The purpose of this section is to provide an overview of the major events in the design process. Table 1 presents a timeline of these events, with particular attention to key factors related to the research questions. This section is organized by the timeline and describes, based on all data sources, the key events that provide the context for the presentation and analysis of data in response to the research questions. The history is divided into four overlapping phases: 1) getting ready, 2) program design, 3) facilities design, and 4) site selection.

Getting Ready

This first phase takes place during 1993 and 1994 and has three major divisions: preliminary design, feasibility study, and bond issue.

In April 1993, Educational Consulting Services prepared the *Educational Program Design and Facilities Specifications* for the Greater Providence Career and Technical School, which became the Met. This programmatic design was more innovative and complex than the assumed nature of the school's mission. It proposed three academies and ways for students to enter into the workforce through an internship program. It also maintained its relationship to the local hospital. The document stated this would be a cutting edge design for other schools in the state to move toward.

Following this programmatic design in September of 1994, the State Board of Regents approved funds for an architectural firm to do a Feasibility Study of Metropolitan Regional Career and Technical Center at the South Providence site. This school was to be "150,000 gross square feet grouped into three interconnecting structures" (p.1). The plan called for shared use of a library, theater, and daycare center with the Community College of Rhode Island. An athletic field would "provide a buffer between adjacent communities. It would also be used by the neighborhood when not used by the school.

In 1994, a $29 million bond issue was passed by voters in the state of Rhode Island for the second of five new career and technical schools (The Davies School in Lincoln, RI was the first). Although not stated in the bond issue, there was an understanding by the Chairman of the State Board of Regents with the community of South Providence and the State of Department of Administration (Memo to Governor Sundlun from Michael O'Keefe, April 8, 1993) that this new school would be built in South Providence next to the South Providence campus of the Community College of Rhode Island and near Rhode Island Hospital. At this time, the chairman of the State School Board was also the chairman of the Board of Trustees of the Rhode Island Hospital. The hospital's land abuts the school property.

This memo was sent prior to the passage of the bond. It stated that the head of the State school committee recommended purchasing the land prior to bond approval, and in the event the bond for the school didn't pass, the land could be bought by the Rhode Island Hospital or the Community College.

Table 1
Timeline of Major Events

Phases/Events	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Getting Ready										
Preliminary Design	——>									
RGB feasibility Study		——-->								
Bond Issue		—>								
Program Design										
Annenberg			——>							
Big Picture Company			——>							
Prototype Implementation				-——>						
Facilities Design										
Committee Selection						——>				
Architect Selection-Public						—>				
Design Work						——————————>				
Site Selection										
Armory				——>						
Satellite School						——>				
Main Campus						—————————— -->				

document alleviated any fears and trepidations these agencies might have in moving forward with bringing a bond referendum before the voters, because in the end the land could be purchased by the other entities.

The proposed school was initially seen as a career and technical school serving Providence that would possibly take the place of another career and technical school located on the campus of Central High School. A memo dated May 31, 1994 from the Director of Career and Technical Education to the State Board of Regents stated that the mission of the school was to provide skilled workers for Rhode Island Hospital. A career path would be developed as a tech prep model, with graduating students from the Met going to the Community College of Rhode Island and then to the hospital to work as medical technicians.

Program Design

This second phase covers the period from early 1995 through September, 1996 and has three major divisions: Annenberg work, Big Picture work, and design prototype implementation.

For another year, nothing was done with the development of the Met. When questioned about why nothing was done with the design and site, the Commissioner stated the Department of Education did not have the capacity to carry out the work in a timely way. Then in 1995, Dennis Littky and Elliot Washor (the researcher), who were at the Annenberg Institute for School Reform, proposed to the Commissioner of Education in Rhode Island, the Director of Career and Technical Education in Rhode Island, and the educational design consultant, who prepared the original programmatic design, that they take on the development of the programmatic and physical design of the school with the intention of also directing it for a number of years. The Commissioner agreed, because he did not see any way of moving the school from the planning stages to implementation without external support. Littky and Washor felt they could bring revenue from Brown University and the Annenberg Institute to the project. These funds would help Governor Almond commit to releasing bond money for developing an implementation plan. The Governor agreed and the idea was then passed by the State Board of Regents that allowed the newly formed Big Picture Company, a non-profit organization, to do an implementation plan that would include a programmatic design and then a feasibility study for the physical design of the Met. In this way, the building would match the programmatic design of the school.

For the next year (1996), the co-directors of The Big Picture Company, reviewed the programmatic design with the Commissioner, the head of the State Board of Regents, the State Board of Regents, and the Governor's education, policy, budget, and administration directors. The Human Resources Investment Council also supported this initiative with an award to develop the centerpiece of the Met's curriculum, the Learning Through Internship. Many key business, union, and state policy people reside on this board. When the Met received this grant, the Council and its members were giving their approval to this innovative design.

The innovation of the Met rested on a set of learning signatures that created not one, but a series of small schools. The students would be heterogeneously grouped. There would be no classes or grades. The approach to this type of education goes back to Dewey's (Dewey 1913) work. The philosophical underpinning was that starting with student interest; education could be delivered one student at a time in a community of learners. The learning signatures as stated in the Met Feasibility Study (Bingler, Littky and Washor, 1996) for the Met are:

Philosophy of Space: A Guideline to Designing New Facilities

Ideally, the physical space of any school—site and facilities—is designed after, and in service of the program of the school. Form should follow function. This is the case at the Metropolitan Center. The program, as described in the *Implementation Plan of the Metropolitan Regional Career and Technical Center* (which can be obtained through the Big Picture company), grew directly from widely held ideas of the kinds of teaching and learning that are best for students. Now, the physical space of the Met must support this program. Much of the learning program of Met students happens in places not traditionally considered "school"-businesses, community organizations, and home. New buildings will also house educational programs and support the learning in the community. To begin to understand how bricks and mortar could help us implement the Met's teaching and learning goals, the first step was to create a philosophy for the design of the new facilities, based on several main features of the program.

1. Personalization
Facilities where teachers and students meet and work are small and encourage students and teachers to get to know one another well, both intellectually and personally.

2. Following Interest
Facilities provide for student exploration of a variety of interests as well as facilitate connections between students and outside resources in the community.

3. Authentic Learning
Facilities support learning that takes place all over the city. Rather than being organized only into classrooms, school space is organized for meetings, research, collaborative work, and individual skill building. Facilities enable real and "virtual" connections locally—with homes, businesses, and community—as well as to places and resources far beyond the local level.

4. Community Building
Facilities foster a strong sense of community on several levels: from very small groups of students sharing a project or advisor, to the whole-Met community.

5. Community Partnership
Facilities are designed to integrate the Met and its community. Students and teachers use existing community resources, which new school facilities do not duplicate. Conversely, new facilities satisfy some community needs, and are available to the community from early morning to late evening.

6. Ownership
Met facilities, like the Met itself, are owned, and cared for by all users. Students and adults of the Met community take partial responsibility for the security and maintenance of these facilities, and all Met community members learn protocols of sharing space and resources.

7. Community Design and Diversity
The aesthetics and design of school facilities reflect the needs and desire of the diverse group that is the Met community, as expressed through public design meetings.

8. Flexibility
To ensure that the facilities always support the changing programs and functions of the Metropolitan Center, flexibility of interior and exterior spaces is built into their design.

9. For All Students
The Metropolitan Center's facilities are accessible to students and adults with physical and learning disabilities

10. State Education Leadership
As a model and center for education reform in Rhode Island, the Met's facilities host professional development and telecommunications activities for the state and for the nation.

DESIGN CONCEPTS

As we advance a vision for the Met, the following principles lead us to a conceptual design:

Functionality
The design concepts for the Met Center have been developed in concert with the philosophy of space developed by the Big Picture Company in collaboration with students, parents, educators, and representatives from the Providence community. The architectural layout and image reflects the stakeholders' desire for smallness and a feeling of neighborhood scale. The final design will provide the flexibility and accessibility necessary to allow teachers to work according to their own needs, while encouraging every student to follow his or her own interest.

Sustainability
The design concepts for the Met Center address the educational environment as a part of the whole community system. The symbiotic framework for this relationship will include a wide range of physical, social, and economic components that support the operational as well as financial needs of the project. The final design will also support the long-term ecological sustainability of the built and natural environments.

As the design principles emerge into a physical plan for the Metropolitan Center, the look and feel of the traditional school will be replaced by a new manifestation of educational and community objectives. Rather then being constrained to a single site, the floor plan for the new facility will emanate as a map of South Providence.

From the design, principles, and philosophy of space emerge the list of forms, which follow the programmatic functions of the Met. Both physical properties and operational activities are innovations, which support the program and goals of the Met.

- Small Schools
- A larger central facility
- Neighborhood buildings
- Inviting spaces
- Advanced telecommunications equipment and facilities
- Facilities complement--don't duplicate—existing community facilities
- Extended-hour access
- Students help run the facilities
- Multi-use spaces:
  -Conference capacity for education leadership
  -Space designed for community needs
  (Bingler, Littky, Washor, 1996)

At monthly meetings of the State Board of Regents, the programmatic design of the Met was approved and the Board granted the Met program status, but it was not officially a school. This status was the result of trying to figure out how to make the Met into a Local Educational Agency that could accept funds, have its own board, and in essence operate independently of RIDE (Rhode Island Department of Education) and be a state school without being tied to the regulations of the state systems. In reality, the Commissioner was creating the environment for the Met to become a school district. At this point in time, it became clear to the co-directors of Big Picture that if the Met were to become a school and not remain a program, the next step would have to be to enroll students and start without a building. This would make the school real and put pressure on the system to expedite a very slow and tedious facilities design and construction process. It was also felt that the school's programmatic innovations could not be planned any further without having students and staff to turn theory into practice. In his interview, the commissioner remarked that starting the school without a building was politically the wisest decision that was made in the whole project.

In June of 1996, the Met received funding from the Rhode Island State Legislature to become a funded program for 55 students. That summer, members of the Big Picture Company scurried around and found space for the program in the Shepherd Building, the downtown campus of the University of Rhode Island.

Facilities Design

This third phase covers the period from late in 1995 through September 2001 and has three major divisions: committee structures, architect selection, and design work.

Since the Governor was allocating bond funds, his departments also assigned staff to the project. Two state administrators, a state administrator from the Department of Administration, and a state administrator from the State Properties Committee were added to jump-start, and be included in, the oversight of the project.

A Committee was set up to approve all design features and these would be taken monthly to the State Board of Regents for final approval. This committee consisted of members from RIDE, including the director of Career and Technical Education, State Administration and State Properties, Big Picture, and State Board of Regents. Other state agencies that were part of the process included State Policy, Budget, Purchasing, and Environmental Management.

In 1995, after an extensive search process that included interviewing six architectural firms, the Big Picture Company hired an architectural consultant from New Orleans. His contract was approved by the Design Committee after two months of deliberation.

Over the course of the next two months, a series of design charettes was conducted that included all members of the design committee. These design charettes, along with meetings of the Design Committee, formed the basis for the feasibility study completed in July of 1996.

Site Selection

This fourth phase covers the period from late in 1996 through September 2001 and has four major events: Community College of Rhode Island site, the Armory, the satellite campus, and the main campus.

One error RIDE made in the process of land acquisition was to assume that the new site for the Met would be on the property adjoining the Community College of Rhode Island and Public Street (Bingler, Littky, & Washor, 1999). This site was disputed by Governor Almond's Office, because it sidestepped the Rhode lsland Request for Proposal (RFP) process for land acquisition of a state facility. For a year, arguments went back and forth from the head of the State Board of Regents and the community members of South Providence to the Governor's Office and the Department of Administration. The Department of Education believed the passing of the bond was a clear signal that this proposed site should be the site selected. In articles appearing in the Providence Journal. and at State Board of Regents meetings, this site was always discussed with the assumption that the school was going to be there, but the Governor's Office insisted if this were to occur, the state RFP

process would be violated. The economic and political tensions around acquiring this property were high. The minority community assumed this to be the site for the school. In their eyes, the state was finally going to give something to the community. The Governor wanted to make sure everyone had a fair opportunity in the RFP process for state properties. He also wanted to get the least expensive price for any land acquired by Rhode Island. A competitive RFP process gave assurances that the conditions would be right to get competitive bids to make a selection.

After months of arguing and delays, it was decided by a committee consisting of the Department of Education, Department of Administration and State Properties Committee, Budget Office, Governor's Office and Met personnel that the RFP would go out. In February of 1997. An RFP was issued and reviewed in the following months. All sites were rejected and the RFP was reissued. Each time the owners of the site proposed by the Rhode Island Department of Education did not respond to the RFP. At the same time, members of the Design Committee for the Rhode Island Department of Administration and State Properties presented and pushed a property that was owned by the State of Rhode Island located in Providence. This property was the Cranston Street Armory, the largest indoor structure in New England. If the Met were put into the Armory, the programmatic and physical design would be a complete mismatch with this space.

The Met Site Committee proceeded to tour the Armory and meet with the Armory Revival Committee. This group of citizens met with the Governor's staff to present reasons why the Met should move into this structure. It took four months to reject the Armory. A variety of staff from the Department of Administration presented plans to the design committee hoping the Met's administration and Board of Trustees would change their minds. In the end, the co-directors of the school and the head of the Met's Board of Trustees had to formally reject the Armory proposal. Even at meetings as late as September of 2001, administration people felt that if the Met had not resisted the offer to redevelop the Armory, would have had a school years before the time it took to build the school in South Providence.

In June of 1997, all the responses to the RFP were rejected for a second time, and again there was no bid submitted by the owners of the proposed site in South Providence. Three avenues of strategy were now employed. First, a small group consisting of the head of the State Board of Regents' a Met co-director (researcher), and the president of the Board of Trustees of the Met met with a local bank to arrange a meeting with the property owners in South Providence to understand how to access the land. Second, the Met co-director asked the vice president of the Met Board of Trustees to contact the head of the Providence Redevelopment Authority to see if they would acquire the land for the State of Rhode Island. Third, in order to keep the Met School Project moving, one of the small schools would be constructed off the selected site.

In September of 1997, the Met was starting its third year. Each year a class of 55 students was added to the school. By the beginning of the third year, the Sheperd Campus had 165 students, a number that exceeded the number of students for a Met school according to the Met's programmatic design. A decision was made to divide the 165 students into "two schools" in the Shepherd Building. In an effort to keep the facilities project moving, the idea of building a small school near the South Providence site was made by the co-directors of the Met, and the chairman of the Met Board

In the original Feasibility Study done by the Big Picture Company and the national architect, small satellite schools were to be built only after the main campus of six small schools was up and running. The campus with a community kitchen, fitness center, community -based outreach spaces, community cafeteria, and a host of other innovations would support all the small schools including the schools built off the main campus

In February of 1998, four months after the RFP was issued, a site on Promenade Street, Providence was selected. The state awarded the contract to a local architect and construction company. It was the first time in Rhode Island history that such a group was allowed to contract with the state to do all of the development, design, and construction without going through the state system. The process is known as a turnkey process. The state administrators decided that using a turnkey was the only way this school was going to be built in a timely manner. If the state system were used, it would add years to the project. For the next five months, this turnkey group with the oversight of the Design Committee assembled the land, designed the building, and got the necessary permits. They worked closely with the State's Design Committee and set up a rigorous timeline that had the school ready for opening in September, 1999. At the last minute, their real estate partner backed out, and the local architect and the construction company were left with no land, but they did have a fully developed design and a construction company ready to put its efforts into building a school.

In response to losing their real estate partner, the local architect and the construction company asked the State's permission to find another site. The State allowed them to search for another site without going out for another RFP process. On June 18, 1998, a new site was found on Peace Street.

In order to expedite the turnkey process, the Rhode Island Department of Education contracted with the educational consultant who prepared the original program design to do the architectural specifications for the first small school and for the school facilities consultant to do the furniture, finishings, and equipment (FF&E).

By September of 1998, the State Properties Committee approved the contract for the construction of the Peace Street facility. The school was built in seven months. The Peace Street Campus opened for the fall 1998 start of school with 110 students.

While the first small school was being assembled and built, the work to acquire the land for the South Providence campus site continued. The meetings mediated between the bank and the State, and the Met school came to a dead-end because the State could not figure out a process to acquire the land without dealing directly with the landowners, and thus violating their own RFP process. The final option to acquire the land was exercised when the State agreed to meet with the Providence Redevelopment Authority (PRA) in June of 1997. Over the next, seven months a contractual agreement was reached that allowed the City of Providence to assemble the land, and then after it was free and clear of all buildings, all environmental issues, and all utilities issues were properly dealt with the State would purchase the land from the City. This process of assembling the land and doing the site prep work was to take eight months. It was to be completed by June 1998 or the agreement between the City and the State would be null and void and the State had the right to back out of the agreement.

Over the next three years, a myriad of problems occurred that delayed the turning over of the land to the State from the Providence Redevelopment Authority. These problems included contract language issues between the lawyers of the State and the City, as well as the following land acquisition problems:

- The Providence Preservation Society forced the City to move two buildings they deemed of historical significance.
- Landowners negotiated with the City for higher prices for their land;
- The bureaucracies of Verizon and Narragansett Electric Company took a considerable amount of time to issue orders to terminate service to this site;
- Street closings and the readjustment curbing had to go through the City bureaucracy
- A major dispute began with Providence Gas Company to move a 24-inch gas main off the property. This line fed all of western Rhode Island.
- A sophisticated design and strategy was needed to deal with water run-off and sewage treatment developed by the Department of Environmental Management and the Narragansett Bay Commission.
- A major environmental plan and clean up the site was ordered by the State Department of Environmental Management for contaminated soil.

Even down to the final days before the turnover of the property, issues occurred between the city and the state over Zoning Board Hearings and State Property Hearings. Finally, at the day of the approval, a Providence City Councilwoman who is also a member of the Met Board of Trustees stopped the Providence Redevelopment Authority from approving the land transfer to the state, because she wanted an accounting of the number of minority employees put to work on the project thus far as well as a dollar amount of funds that were paid to them. The approval was supposed to occur on September 18, 2001 and was delayed to the next Providence Redevelopment Authority Board meeting on October 11, 2001. In these cases, the forces at work of the various agencies and corporate entities caved in to many of the standard operating procedures and regulations the system has put in place for a public project. This oversight delayed the project for years. Still, the Met educators held firm to their programmatic and physical design, moving the project forward and not backsliding.

The State acquired the land in the fall of 2001, and construction started in December and continued through the winter. The school was scheduled to open in October 2002 [actually opened in January 2003].

In conclusion, there were important strategies developed to deal with the significant forces at work and tensions around the events described in this history to translate innovative pedagogical designs into facilities. An analysis of the history reveals a number of innovative strategies developed in the translation process. The Met educators constantly moved the project forward and did not backslide on the original programmatic design. This “no backsliding” strategy eventually moved the State Board of Regents to pass the programmatic design. The passing of the Met’s programmatic design allowed the state administrators to see opportunities to reinvent the way the state system works, so they developed new processes for

land and acquisition and construction. In essence, each innovation on this project led to more innovations.

School Sites

The Met is a unique design but there are other schools that have or are in the process of translating their pedagogical designs into facilities. There are three types of cases reviewed in order to understand some of the issues from others' perspectives. The first group consists of schools that have their own pedagogical design:

- The Eagle Rock School - Estes Park Colorado
- The Reggio Emilia Schools - Reggio, Italy
- The Odyssey School - Denver. Colorado

A second group of schools are those that have followed the Met design. These schools are public schools that subscribe to the same pedagogy as the Met. The Big Picture Company is working with these schools as replication sites. Each school's location and environment is different, but they have each developed school facilities with the support of the Big Picture Company. The directors of these schools were interviewed. These schools are:

- MetWest - Oakland, CA
- Truman High School - Federal Way, Washington
- University Preparatory Academy - Detroit, Michigan

Finally, there is a short story on the issues of another Rhode Island state school project: The Rhode Island Training School - Cranston, Rhode Island. This case is told as a comparison to another school project the State of Rhode Island has at the same time they are building the Met.

Each case study is a different probe. Two schools are private schools, but operate with the public good in mind. Eagle Rock pays for all tuition and expenses. It is a residential school. Reggio Emilia has a small tuition but it is waived if a family has no money to pay. Both schools have developed unique design features. It seems the private schools have a better opportunity to get their learning environment the way they want it. It is also noted that the degree that they have gone to re-think their environment is very different than what is allowed in public schools.

The last school in the first group is a public charter school. Even with its charter status, there were major difficulties in the design process.

Group 1: Unique Design Schools

Eagle Rock

At the Eagle Rock School in Estes Park Colorado, the American Honda Corporation funded the entire building of the school as well as the curriculum. The head of their corporation sat on the Board of the Eagle Rock School. The thematic design of the school was based upon service and social justice. Students had to do volunteer work in communities all over the United States. Honda Corporation was in favor of all aspects of the programmatic design and leaving the program design up to the educators; but when it came to the physical design, they insisted on a number of things that reflected their corporate identity. First, Honda insisted that staff was not to have any private offices, and then they also insisted that the system furniture for staff offices be limited to a certain height where everyone could see one another if they were standing, but would have a difficult time if they were seated. Given the nature of the work at Eagle Rock with a student population that had a high number of at-risk students, the notion of privacy was very important. Yet Honda insisted on the office space because of their corporate model and not on the educational program.

Aside from the corporate culture most of the physical design was left to the educators. Tables in seminar rooms are always round to give students and staff a sense of equality. It also means no one could hide and everyone Is seen. This is a school where the director believes each and every student's voice must be heard. Once when speaking to a group, he stated to students, "You have no right to no opinion."

Eagle Rock is a small school of a maximum of 80 students at any given time. It is at the gateway to Rocky Mountain National Park. It sits on top of a mountain near the Eagle Rock. The school's exterior colors were specifically designed to blend and match the landscape. All houses are kept small. There are rooms where the whole school can gather and run democratic meetings. One such room accommodates students by allowing them to sit on a floor that has built in heated coils under the carpet. Almost all of the seats in the school are padded and many rooms have rocking chairs. Another unique feature is the rooms they have dedicated to their exhibitions, called Presentations of Learning. The seating in these rooms is like a small amphitheater. They are lit very well with an eye towards focusing everyone on the presenter.

Students have a very rigorous schedule that keeps them going from early in the morning until late at night. They also have rigorous demands placed on them. Students are expected to attend all classes and do community projects and project-based learning. They are also expected to do chores, make sure the space is kept up and actively participate in the community. The graduation requirements are very stringent and it could take five and six years to graduate.

Eagle Rock challenges the mental model of what a school can be both pedagogically and in its learning environment. It was set up by the American Honda Corporation to help an at-risk population; and because of its location and practices, the many educators who come to the school find it a welcome breath of fresh air but do not believe it translates back to the schools they are in. The combination of location, funding, practice, and smallness makes Eagle Rock a school that is a different design that challenges the mental model people have of what a school should look like, where it should be, and the program it should have. The school does have a professional development center for educators from around the country to use for retreats. The school also offers workshops on their practices. At this point, there is only one Eagle Rock School and there are no plans for any more.

Reggio Emmilia

The Reggio Emmilia pre-schools in Italy have been in existence for over twenty years. These schools have established a design where children work collaboratively in small groups around projects while the teaching staff documents and discusses learning. In Making Learning Visible (Seidel, 2001) it is pointed out that, the environment is the third teacher. The Reggio schools have furniture and room structures set up to allow their program and learning to thrive. The rooms are rich in materials and have space for viewing student learning. Students are given problems to solve, like drawing the game Ring Around the Rosie, and teachers probe and prompt the children as they redesign their work until these students understand perspective and depth in their drawing through their own practice and language. Their work ends up being remarkable by United States educators' expectations.

Reggio designs rooms very specifically. They also design their own furniture that can be purchased through the internet. Reggio rooms have enough space for adults to document and observe children. The classrooms are rich in materials with lots of light, and the cleanliness of the rooms is beyond what most Americans could imagine. The children's dining rooms have expensive tile flooring and the setups for each student's place settings are similar to those in a fine restaurant. Reggio has music rooms, art rooms, crafts rooms and throughout all of these rooms, student work is prominently displayed.

Discussions with teachers from Reggio show how seriously they take the environment they created in their schools, but for all this work at the pre-school level there is no continuation of the model beyond pre-school. I asked an 18 year-old who graduated Reggio if or how she uses what she learned. She stated, "it is something that I keep in my pocket all the time and when I need to use it I take it out." (Lecture at Harvard August, 2000).

The children from Reggio go into traditional schools starting in the first grade. The teachers of Reggio were not uncomfortable with this lack of transition. They see their work as pre-school, not beyond. The structures of bureaucracy in Italy don't permit a Reggio school to be funded beyond the pre-school. The government sets standards and expectations at each grade that are tightly controlled. Therefore, if Reggio schools tried to bring their design into the Italian system, the system would change their practices.. The people at Reggio have made a conscious decision to only have pre-kindergarten schools and not take on the educational bureaucracy.

Odyssey – Denver, Colorado
An Expeditionary Learning School

The Odyssey School is in its fourth year. It is a K-8 public charter school and is part of the New American School Designs as an Expeditionary Learning School. The philosophy of this school challenges students in mind, body, and heart by allowing them to go on expeditions to develop projects. Students use the world as their classroom. Presently, Odyssey is temporarily leasing an old Catholic School that they brought to code. Their future home is being built by the Denver Public School District in the newly designed Stapleton Community. Stapleton is a planned community utilizing the land from the abandoned airport. The size of the airport land is about 1/3 the size of Manhattan. When completed 30,000 people will live there. The Stapleton Foundation manages the project for the City of Denver. There will be new schools, offices, housing for all levels of income and green space. Stapleton is billed as a sustainable community and is the brainchild of Sam Geary, one of the wealthiest men in the world.

Odyssey will be sharing space with a Core Knowledge School. This gives parents in Stapelton options for their child's education. The founding principal of Odyssey was interviewed about the issues of designing and building the school with the Denver Public Schools.

The founder stated the design process was long and tedious. There have been numerous delays in building the school. The initial occupancy was to be September, 2002 but it looks more like September, 2004. Some of the issues delaying the school opening were environmental, but they were dealt with and ran their course. The more difficult issues were convincing

the facilities manager of the Denver Public Schools, the architects, and the construction companies to design the following features into the school:

- Demountable walls
- Sheet rock walls
- Different configurations and square footage for classrooms
- Space for teachers

The principal stated that he wanted demountable walls for flexibility, so when the program changes the space could change. The idea was rejected by the facilities manager and by the architects. When the principal asked what their decision was based upon, they claimed durability. They wanted to build something that would last 100 years. The argument was made that using demountable walls insures that the school would be able to change with the times and they would be durable, but this is a different type of durability. They wanted rigid and stiff, and the innovative principal wanted durability through flexibility.

The request for sheet rock walls was also countered with the district's predisposition for their type of durability, but this time it was around lower cost for maintenance and upkeep. Sheetrock looks more like a home and office, block construction more institutional. The facilities manager also pressured the principal by stating that if he wanted the school to be built faster, then it would have to be block construction. Sheet rocking takes much longer.

In the Denver Public School system regulations state that classrooms must be 900 square feet and box shaped. The principal wanted the classrooms to be smaller because they have less students in a class and he wanted more room for staff to have offices and meeting space. This request was turned down because all schools had to conform to the standard code for a classroom.

The only battle the principal won was to have this charter school built by Denver Public Schools. He reasoned with the district that the money the district was giving him for any facility would be leaving the district for leasing, renting, or purchasing a facility, but if they built a school, they would get to keep this money. They would therefore be paying themselves. They agreed to build the school only when Odyssey could share space with Core Knowledge. This way only one cafeteria and one gym would be built for two schools. In this way, the district turned two small schools into a larger facility. All of this data brings a unique small school back into the mental model of the traditional school. Although programmatically Odyssey is very different, the physical space has been pushed back to conformity.

Group 2: Met Design Schools

Oakland - MetWest

In March of 2001, a new principal was chosen for the new MetWest, a Big Picture School in Oakland, CA. MetWest was slated to open in September of 2002. The Superintendent signed an agreement with The Big Picture Company whereby the school district in Oakland would provide the facilities for MetWest and the Big Picture Company would provide the programmatic design including principal training and materials for the staff and students.

One of the major issues of concern for starting up a school in Oakland is finding land and finding a school design that meets earthquake code. The Bay Area Coalition of Equitable Schools (BAYCES) is working with the Oakland School District to build twenty small schools. The Bill and Melinda Gates Foundation awarded BAYCES $20 million dollars to help support the start up of these new small schools. One factor that helped with the speed-up of the start - up process has been the easing of the earthquake regulation code for schools in temporary office space. The issue of space for small schools in Oakland was a major hurdle to overcome if these small schools are to get started. Without sufficient funds for capital costs for small schools, the whole project was in jeopardy due solely to time and cost factors for small schools facilities.

Truman High School

Truman High School is an alternative high school in Federal Way, Washington. In 1996, two bonds were passed in Federal Way, one for a new 2,300 student high school and another for a new facility for Truman, a small alternative high school. In the fall of 2000, the principal, facilities designer, and the director of high school programs went on a nationwide search with their architect to design and construct the two new high schools in Federal Way.

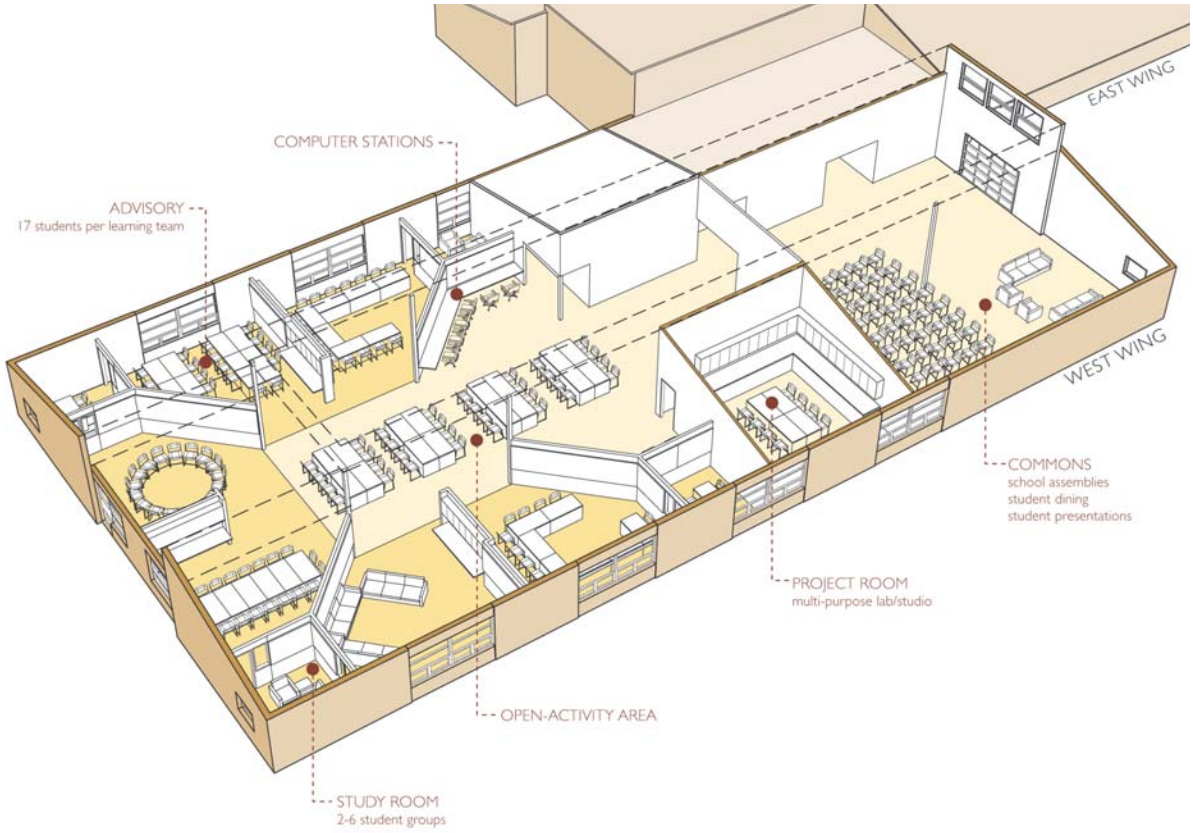
The large high school was already designed, but the team was trying to figure out ways to alter the design so it could at some point in its future be made into a large school of small learning communities (Nathan, 2001). Small learning communities are the most recent term used to describe how a large high school converts itself into a series of more personalized environments. This team of school designers had lost in a vote of the School Board to design this new high school in a more radical manner, but had not given up the hope of searching for and incorporating design elements that would make this large high school more

personalized. For example, although the Board insisted that the school be in one building, this team designed the school so there were enough shared spaces-- like a gym and an auditorium between areas-- that each "wing" of the school could in the future function autonomously as a small school.

Truman was the other high school scheduled to be built. Although Truman already existed, its programmatic design was not working for its 200 students. The school board passed a bond to build a new Truman with a new programmatic design for 200 students. This team went out and looked for models that would meet their needs. They visited High Tech High in San Diego, The New Country Day School in Minnesota, Urban Academy in New York City, and the Met in Providence Rhode Island. All of these schools were selected as models to be replicated by the Bill and Melinda Gates Foundation.

After their visits, the team chose the Met as the design for Truman but for their physical design, they did something different. They decided to incorporate different elements of the different models they saw in their physical design, as well as use the strategy they learned from their own design experience at their larger high school in Federal Way. The Truman design ended up being two small schools of 120 students, each separated by common office space shared by both schools. Each school has its own entry. Reminiscent of High Tech High and New Country, every student has their own workspace. There is common space where each school can meet for community meetings. Each school also has advisory space similar to the Met. There is also a 2:1 student -to -computer ratio that is found in every one of the model schools. Truman also utilizes a joint use gym, that is being built by a Boys and Girls Club on the same property, and a Daycare Center.

The architects for Truman High School had two meetings with the Met staff. Both occurred in June of 2001. At the first meeting, a Met educator (researcher) met with the architects in Federal Way and the final meeting occurred when they came to the Met. The architects walked away with a good sense of the Met but they did not follow-up with the Met or Big



Truman High School, Mahlum Architects
DesignShare 2002 Citation Award Winner, plans and details at:
http://www.designshare.com/awards/review.asp?project_id=143

Picture staff after these meetings.

When Federal Way staff visited the Met in October of 2001, they reviewed their architectural plans. At that time, both the Met and Truman staff saw that they were confronting a similar problem with a large space designed with system furniture and computers set up for students to do individual and group work. The problem was how to keep noise levels down and engagement in learning high. It was clear from designs at both schools that these spaces were in the middle of a traffic pattern where students would be coming out of rooms and using this space as a walkway to get to other places. Three possible scenarios came out of this conversation:

- This space should be set up as a place where students will meet and communicate about their work
- Screen the space so students aren't as visible and will be able to keep working uninterrupted
- Set up space as a library situation for research

What is interesting is that these schools were dealing with space and environmental issues reminiscent of offices rather than schools. Teachers were talking like project managers and CEOs. This is a shift in how educators are thinking about and living in learning environments (Stamps, 1998). These shifts do not conform to the mental model of schools. It signals, a similar pattern of innovation across school districts in translating innovative designs into facilities.

There are other interesting mental shifts also occurring at Federal Way. The principal and the design committee used an interesting strategy of getting the School Board to approve the Truman design for two autonomous schools. By presenting the Board with a mental model of a school design they had approved that showed small learning communities separated by a gym or an auditorium, they were allowed to design two schools separated by offices and administration areas and got approval. The leap of faith around two small schools was not a leap but rather a two-step process. They first took the approved design elements from the large high school, and then used that design element as something familiar to get a more innovative design approved. Once the small schools were approved, the board had no problem approving the interior design of the school. This design was even more innovative than the notion of two small schools. The use of the two-step process moved the Board to approve a different design of a school.

In June of 2001**,** the school Board of Federal Way voted for Truman to become a Big Picture school. The notion of finding models that work and bringing them back for review is a possible way of changing the mental model of Boards and the public. If there were a model high school for small learning communities, more might be built. But as demonstrated, if a design committee were to take a two-step process, they may be able to get approval on more innovative school designs, as was the case in Federal Way.

University Preparatory Academy

University Preparatory Academy (UPA) is located in Detroit, Michigan. The founder of the school was an Assistant Secretary at the United States Department of Labor and ran for Governor of Michigan and Mayor of Detroit. In the fall of 2001, the founder opened University Preparatory Academy and became the first Big Picture School in operation outside of Rhode Island. Throughout the year, staff from Big Picture went to Detroit to work with UPA staff on their programmatic design. UPA opened as a sixth grade and will grow to three grades (6-8) and be three middle schools. In September 2002, the plans are to open a high school near the campus of the University of Detroit.

The founder's long-time standing in Detroit and knowledge of how to get things done paid off in many ways. One of the biggest pay-offs was that he managed to secure funds from K-Mart and purchase an ignored, rundown, abandoned Community Medical Center that was constructed in 1960 and built by the famous architect Albert Kahn. The founder envisioned this building that was stained with graffiti being the new site for University Preparatory Academy.

This building is in a neighborhood of the many museums of Detroit and in close proximity to the downtown area. Middle grade students have access to the museums for their project work and are able to walk to these museums, as well as to internship sites in near-by businesses and non-profit organizations.

When it came time to design this building, the Met's national architect was called in as a consultant. The national architect and local architect designed both the Peace Street Campus and the South Providence Campus of the Met. Met educators also spent a day with local architects and design consultants in Detroit. At these meetings a design was developed that changed the founder's original thinking of having a grade on each floor to having three separate spaces on each of the floors for three autonomous small schools, each containing grades 6-8. It was also decided that each school would have its own commons space that would be large enough to fit the whole school for daily meetings. Each school would also have open space for students to collaborate on projects. As much as possible, rooms along corridors would be replaced by a more broken-up look with advisories of irregular sizes.

Project room and commons spaces would be placed between advisories to lose the effect of the long corridor look.

It was also expressed to the UPA design team that colors and furniture should be reflective of a home and office look. Cinder block construction would give way to sheet rock and other materials that were less durable but were more akin to what students would find in their homes. Paint colors would be selected for their warmth.

The constraints of time, money, and pressure from builders led to some design changes. The schools kept their own identities on each floor, but it was decided that two of the three schools would share space on the fourth floor, thus mixing the school populations. Although the first floor had many of the features discussed at the design meetings, the other floors started to look more like a regular school. The founder pointed out that to some degree the building's shape played a role in this design decision, because the building has a "wedding cake" appearance whereby each successive floor moves inward. Upon probing, it was found that special rooms such as rooms for language and library were added to the upper floors and these "specials" constrained the design to set up autonomous schools on each floor. Students from all of the schools would be sharing space on the top floors. Once again, the mental model of what a school should have, not by law, but by looking at the traditional school paradigm influenced the design of the school, and the model backslid into some learning environments that reflected what has always been.

The same was true for the color scheme of the walls. The school has bright orange and army pea green walls and ceilings. The kind you commonly find in most schools. The founder stated that the walls were this color because the designer felt that Detroit was such a cloudy place most of the year that the students would be well served by bright colors. One has to wonder why they so closely resemble what people think of as wall colors in a school but not a home.

The accomplishments of getting a school built in 14 weeks for $70 a square foot can't be ignored. Without the time and the cost of the project coming into line, the children would not have been in school on time for the fall of 2001. Would wall color stop the project from being completed on time? Would it cost more money to keep the schools autonomous? The answers are an emphatic, No!. Paint costs are the same and you are actually adding cost by creating rooms for "specials" like Spanish class. On the other hand, additional costs are incurred when you jag the corridors. The cost differences would be negligible to follow the Met's learning signatures. In this instance, the traditional mental model of what schools should be is holding the architect, designer, and educator hostage.

In Detroit, there is further evidence that the founder is caught in his own old paradigm of designing new schools. In late October of 2001, Met educators (researchers) went out to consult with the founder on the site selection for their new high school. An anonymous donor offered to foot the bill for a new Big Picture high school on a site selected by the founder. After viewing, two out of the three sites all agreed they were not suitable because of location. The third site was on the campus of the University of Detroit where their president was ready to accept a high school on their campus. The founder immediately felt that there was not enough space on the campus to build small schools. He suggested taking the Met Campus model and putting a gym and the performance center between two schools so each school would be on a separate floor and divided by either the gym or the performance center. His other idea was to connect the schools through a passageway. Both ideas would put 440 students in close proximity to one another thus contradicting one of the primary learning signatures of BP schools. It was explained to the founder that the noise levels of separating the schools with a gym or a performance center would alone be an unsatisfactory design. Upon closer probing and examination the following designs were suggested:

- Low use or non-usable space (buildings) on the campus could be found and serve as space for small schools.
- Less land would be needed rather than a five acre campus design, if new buildings were put all over the University of Detroit campus.
- A spread out campus-wide design of small schools would create the feeling of being on a college campus for high school students. Rather than being a high school on a college campus the school could feel more like part of the college than a high school.

It was difficult for the founder to design small autonomous schools regardless of whether costs were similar. The mental model of a traditional school and its program crept back into the design, forcing him back into the old paradigm.

A Special Case: The New Rhode Island Training School

On January 17, 2002, an article appeared in the *Providence Journal* about the delay in building the new Training School in Rhode Island. The article stated that the architects revised their estimation of the completion of the project from 24 months to 42

months. Although no details were given about what specifically caused the delay, it was stated that the project was more complicated than originally thought. Two days later, the educator saw the Department of Administration and State Properties administrators for the Met. He knew they were both working on this project as well as the Met. The state property administrator told him that the article was wrong on their timeline. She explained to me that the State of Rhode Island has been under court order to build a new Training School for the past 23 years. The extension to 42 months was just one more delay in the project. I asked her if anyone had been on the project that long but she could not recall. Most people who started the project were now retired. At this time, she was also asked what she learned from the Met project that she could use on other projects or if that would help her on other projects. She stated that she learned the "design-build" method of giving the architects and construction companies more responsibility and allowing them to self-perform was the way to go. Two days later in a phone call, the state administrator was asked about the delay in the Training School. He agreed with the state property administrator's assessment and gave an example of what was causing the delay. He stated, the design called for a 300-yard outdoor athletic field. A bureaucrat at the State Department of Health insisted that the youth inmates could not be exposed to the potential mosquito threat, West Nile Virus, and therefore demanded that the plans include a mosquito netting encompassing the whole field, eliminating the entry of mosquitoes and thereby not allowing any of the youth to be bitten by a mosquito during their daily exercise. The Department of Health deemed that the State of Rhode Island would be liable if any incarcerated youth was bitten and died or received a serious injury from a mosquito bite. He pointed out that this may seem ludicrous, but this type of scenario happens more than anyone would like to admit.

Table 2 presents an analysis of the schools for their innovations. It is apparent from the analysis that redesigns can be built in less time and for less money.

Table 2
Innovative School Sites

Case Studies

Name	Was it a New Model?	Was it a Redesign?	Is the Innovation?			Is the Design being Replicated?	Is it a Charter?	Years to Complete	Cost per sq. ft.
			Political	Social/ Language	Economic				
The Met Providence, RI	Y	N	Y	Y	Y	Y	Y	8	$130.00
University Preparatory Academy, Detroit, MI	N	Y/MET	Y	Y	Y	N	Y	2	$70.00
Truman High School Federal Way, WA	N	Y/MET	N	Y	N	N	N	12\2	$130.00
Odyssey Denver, CO	Y	N	N	Y	N	N	Y	2	$130.00
Eagle Rock Estes Park, CO	Y	N	Y	Y	N	N	Y/PRIVATE	2	N/A
Met West Oakland, CA	N	Y	Y	Y	N/A	N	Y	2	N/A
The Training School Cranston, RI	N	N	N	N	N	N	N	23	N/A
High Tech High San Diego, CA	Y	N	Y	Y	Y	Y	Y	2	$110.00
Reggio Emilia Italy	Y	Y	Y	Y	Y	Y	PRIVATE	N/A	N/A

This section addresses the first major research question and the corresponding sub-questions:

1.0 What are the forces at work in translating an innovative pedagogical and organizational school design into a facilities design?

1.1 What are the key factors that support or impede the translation process?

1.2 What are the dynamics of the relationships between the numerous constituencies involved in the process for designing and constructing schools and how do these dynamics affect the translation process?

The data analysis resulted in the identification of three major forces impacting the translation process: political, social, and economic. These are depicted in Figure 3.

Table 3 identifies the themes within each of these forces. While discrete, these three forces are interdependent, as are the themes within each of the forces.

Figure 3
Forces at Work in the Translation Process

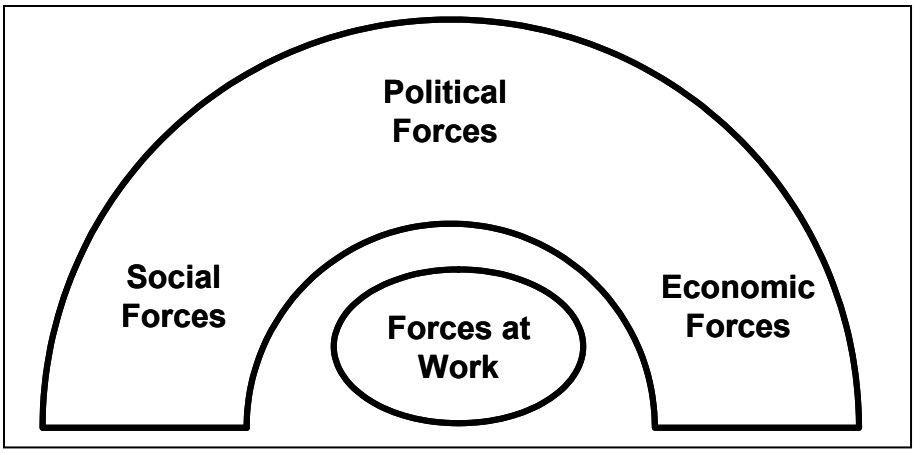


Table 3
Forces at Work: Political, Social, and Economic

Forces at Work	Patterns and Themes
Political	champions, authority, bureaucracy
Social	Language ambiguities, relationships, minority hiring
Economic	Time constraints, budget/resources, efficiency/cost- effective

Political Forces

Data from field notes, documents, and interviews revealed three political forces: champions, authority, and bureaucracy. Several sub-themes were evidenced within each of these political forces.

Champions. The role of champions was a key political theme. Data from field notes, documents, and interviews revealed four champions: 1) the Chairman of the Board of Regents, 2) the Commissioner of Education, 3) the Director of Career and Technical Education, and 4) the chairman of the Board of Trustees for the Met. Each champion played a critical role at several important times during the seven-year history of the design process.

In 1993, it was the Chairman of the State Board of Regents who, with the Commissioner of Education, asked an independent consultant to prepare educational program design and facilities specifications for what was then called the Greater Providence Career and Technical School. At that time, the Regent's chairman was also the chairman of the Board of Directors for Rhode Island Hospital. He had served as head of the Department of Administration during a previous administration. During his tenure at the Department of Administration, the chairman was in charge of designing and constructing a number of state buildings. The chairman had a reputation for getting buildings built for the state. Some would argue that without the chairman spearheading the Met project, the bond referendum for the school would never have made it to the voters. At critical junctures throughout the process, the chairman moved the process ahead.

The Commissioner of Education was similarly positioned to advocate the Met's highly innovative program design. The Commissioner was the key translator of both the programmatic and physical design to politicians, board members, state administrators, and his own staff. Behind the scenes, the Commissioner used his influence to build the Met in the image of its program designs. The Commissioner translated the essential elements of the design to a variety of constituencies and was essential to the

translation of the programmatic design into the facilities design.

In terms of having a deep understanding of the Met's pedagogical design, the person outside the design committee who understood it best was the Commissioner of Education. When he spoke at meetings, his vision for the school actually served as the lead vision. He could always articulate the design and the place for the school in the community better than anyone. The following quote of the Commissioners appears as the letterhead of the school, "The Metropolitan Center puts into action everything that we know works for kids. It will be a catalyst for a statewide effort to strengthen secondary education" (Peter McWalters, RI Commissioner of Education). At another time, the Commissioner's remarks were used by the Met Community liaison as an introduction of the Met into the community.

The State Director of Career and Technical Education, although cautious about the most innovative aspects of the Met's program design, played a pivotal role throughout the design process. He served in that role from 1972 to 1999 and was the longest serving director in the country until his retirement. Prior to heading up the design committee for the Met, the Director also directed another building project for RIDE-- the design, construction, and renovation of the Davies Career and Technical High School. He knew the Department's weaknesses when it came to designing and constructing a school. He knew the state system and also knew how difficult it was to get things accomplished expeditiously.

Whenever he could, the Director of Career and Technical Education would contract with a stable group of consultants he used over the years. These consultants helped him get work done for which he lacked capacity in his department. It was his way of making things work in the state system. For example, he would use a facilities consultant to get work done on furniture design and purchasing and would get support from an educational consultant for designing educational specifications for facilities. The educational consultant prepared the original program design for the Met at the request of the Commissioner and the Chairman of the Board of Regents.

Although the Director was cautious, he would make things move and he had easy access to the Commissioner. Although his previous building project was difficult and came in over budget, he was ready to take on the responsibility of this work. The Director of Career and Technical Education knew more about the politics of the design and construction process than anyone else at the Department of Education.

The Director took the time to understand the philosophy and the programmatic and physical design of the Met. He had his own ideas about how much of this design should be implemented when it came to building a school with state bond funds. For example, he always wanted to see the small schools closer together or in one building. His reasoning for changing the design was not so much educational as it was his keen awareness of how far he could take the State Board of Regents, the Department of Education, and the State Legislature. Also, he was there for the first design phase of the Met and in some ways was still wedded to that design. The prior design was something the Commissioner, the State Board of Regents, the State Legislators, the Department of Education, and the voters could understand and would want. It fit their mental model for an innovative school. The Director of Career and Technical Education wanted to give people what they wanted.

The Director of Career and Technical Education was in charge of the design meeting process. He had his notion of how the process should be carried out. For example, he was not about to go around any bureaucratic, code or political issues. If there were a decision to be made, he would include everyone in the process and would look for consensus from the committee on a decision. This was his strength and his weakness, because he was serving too many masters and that confused the issues. He could facilitate but not lead. Many times at meetings, no one was sure which way a decision was going to go. The Director would go back and check with non-members - The Chairman of the Regents, the Commissioner, the budget analyst, the budget director, the Director of the Department of Administration, and a host of others. It got to the point where most of the decisions came down to whom he spoke to last. It was difficult to get to a decision because the group differed widely on what design the Met was to have. The Director of Career and Technical Education was not doing this work full-time. As stated previously, the oversight of this project is a complex process and the person driving the project needed experience in many different areas ranging from educational, bureaucratic, political, legal, and design and construction.

For the Director of Career and Technical Education, innovation was something that fit in the box or perhaps stretched a point but did not challenge an idea**.** Although the Director of Career and Technical Education was savvy enough to understand the concept of real world learning and promoted it with other career and technical center directors at their monthly meetings, he stopped short of designing a school that used the outside world to get to real world learning.

His talks with the Chairman of the Regents were - mainly about having a facility that would be more reflective of traditional vocational training. Once again, he believed he had to give his superiors what they wanted, and not try and convince them of a new design.

The Chairman of the Met's Board of Trustees played a substantial role at several key points in the process. Perhaps the most prominent was in the case of the Armory when he halted the process of using Met bond funds to renovate the old facility as the Met School. Because he understood the Met design, he was able to articulate to the Governor and Director of Administration the problems in using the Armory as a Met school.

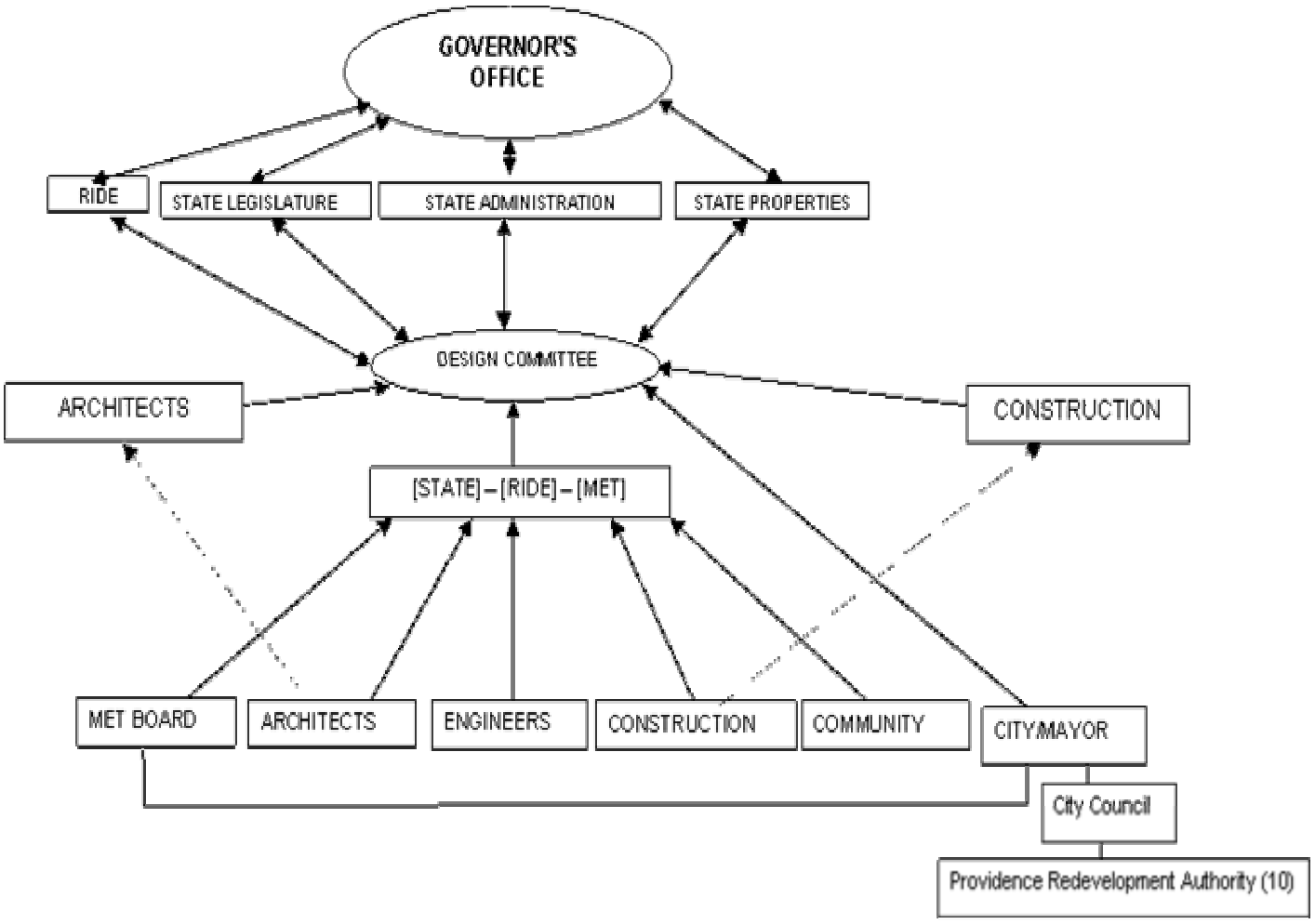
Authority. With so many agencies, organizations, and individuals involved in the program and facilities designs, it is not surprising that authority figured prominently as a theme in the data. Two sub-themes, capacity and control, were most prominent.

Although the Met was a project under the authority of the Rhode Island Department of Education, the Department had little or no capacity to design or build a school. In an interview the Commissioner stated that the Department was, "a regulatory body and not in the business of building schools." At a design meeting in November of 1997, it was pointed out by the state administrator from the Department of Administration that unlike the Department of Higher Education, the Department of Elementary and Secondary Education had no clerk to assist the work of facilities managers or architects on staff to help support any building project. From 1995-1997, a state administrator, on assignment from the Department of Administration, the director of Career and Technical schools, and Met co-director attempted to get the State Department of Administration and RIDE to pay for a clerk to help manage this project. The Department of Administration refused to release bond funds to pay a clerk for this work. . The Commissioner did not have funds in his operational budget for this position. At Design Meetings in 1996-1998, State Department of Administration administrator would reiterate time and again that if the project was important enough, then the Commissioner should find a way to fund a clerk.. Although every year the Design Committee has pointed out how influential and useful a clerk for this project could be, one was never hired.

In this instance, the politics of different departments in the state was an issue that affected the design and pace of building the Met. As noted by the size of the committees, there are lots of people but few with the capacity to design the school. One of the State Department of Administration administrators knew how to do this work, but was given the assignment to oversee and be the clerk for the new home of the Rhode Island Department of Labor and Training (see Figure 4). After leaving this project in 1997, this official had the Labor and Training buildings completed in the fall of 2000, in about 2 years. The other State Department of Administration official also had the ability to head this project, but he was working for the Department of Administration on many other facilities projects. Once again, it was up to the Commissioner to assign someone to the task of clerk for this project, as it was necessary to keep the very complex process of designing and building an innovative school on task.

This issue is an example of all three forces interacting. The political and social tensions between different departments and their heads because they could not allocate a person's time due to monetary (economic) constraints was crucial to enabling a timely completion of the Met facility. This political decision led to a plethora of problems on this project that cost money and time to remedy. A recommendation by any of these heads of departments for a full-time clerk could have solved most of these problems in a more timely and cost-effective manner.

Figure 4
Roles and Relationships of Constituents Involved in Decision-Making on the Met Facilities Project



Key
( ) = number of people indirectly supporting the project

……. = dual placement

When the co-founders of the non-profit Big Picture Company were awarded the contract to do the programmatic and physical design for the Met by the State of Rhode Island and the Department of Education, it marked a new relationship between a non-profit organization and the state. The agreement went beyond the normal consulting arrangements the Director of Career and Technical Education had previously made with external consultants. The dollar amount was the largest ever awarded to a non-profit organization from RIDE to do facilities design work.

At meetings, the Commissioner stated that he knew his department did not have the capacity to develop the school that he wanted these bond funds to produce. Although Littky and Washor were new to Rhode Island and their notions of education were also new to Rhode Island, the Commissioner believed that innovation would now take a practical turn. Although he was sure of his decision, many leaders in his department were not sure what to make of the innovations.

Politically, the Governor had to satisfy the voters, legislators, and community of Providence. He needed to be given the confidence that this programmatic design would work and the buildings that were being built for it wouldn't be outmoded and left as an idea that could not be sustained. It was stated at many meetings by committee members that the open concept design of the past was about to be reborn in the 1990's. This statement was indicative of the strength of the traditional mental model people have of innovations past and how they affect attempts at change.

Bureaucracy. The influence of bureaucratic structures and processes was most pervasive, as evidenced in two sub-themes: committees, and standard operating procedures. It appears that, because there was little precedent for building a school to accommodate the highly innovative Met design, additional committees were established to develop the facilities design process as it was being implemented. This does not mean that the processes for designing and building a school were not known by architects and construction companies, but it does mean that the state system was not organized to design and build a school, much less a highly innovative one. Table 4 shows the membership of each committee and identifies overlapping memberships.

In order to keep the project from getting side-railed, and as a way to involve the more important voices in the ultimate design decisions, an Oversight Committee was set up to make sure that everyone's interests and concerns were being met. This committee included politicians, community members, Regents members, Department of Education staff, Met representatives, and members of the Governor's office. In the course of the seven years of this project, this group met for the first time in November 1995 and never met again.

The Design Committee was the working group for the project. In some instances, it consisted of people who worked with one another on many other state projects. In evaluating the attendance of the group, three people would stand out as long-term members. They are the researcher, the State administrator from the Department of Administration and the administrator from State Properties. Initially, RIDE had four officials in attendance at every meeting. By 1999, three (see Table 4) of these Department representatives had retired and not replaced with even one full-time member. In 1999, it was decided the RIDE lawyer would represent RIDE. During the Design meetings in 2000 the Director of Charter Schools took her place.

Table 4
Committee Members

Design Committee

Architect #1 Design Architect
Architect #2 Construction Architect
Architect #3 - from the firm of Architect #2
RIDE accountant 1995 to 2002
RIDE - Associate Director of Career and Technical Education, retired 1998
RIDE - Associate Director of Career and Technical Education #2, retired 1999
RIDE - Director of Career and Technical Education, retired 1998
RIDE - Director of charter schools and Co-chair of the Met Board - 1999 to present
RIDE - lawyer - 2000 to present
State administrator #1 - Department of Administration - 1996 to 2002
State administrator #2 - State Properties - 1996 to 2002
State administrator #3 - Department of Administration - 1996 to 1997
State Budget officer - State Budget - 1996 to present
The Met co-principal

RFP Review Committee for Small School Turnkey- 1998

RIDE accountant
RIDE - Associate Director of Career and Technical Education
RIDE - Director of Career and Technical Education
RIDE - lawyer
State administrator #1 - Department of Administration
State administrator #2 - Department of Administration
State administrator #3 - Department of Administration
The Met co-principal

RFP Review Committee for Land Acquisition of all potential sites 1998-2001

RIDE accountant
RIDE - Associate Director of Career and Technical Education
RIDE - Director of Career and Technical Education
RIDE - lawyer
State administrator #1 - Department of Administration
State administrator #2 - Department of Administration
State administrator #3 - Department of Administration
The Met co-principal
RIDE liaison
RIDE budget accountant
State administrator #1 - Department of Administration
State administrator #2 - State properties
State Architect - Department of Administration

Review Committee for Construction Manager Committee 1999

Equity Officer
The Met co-principal
RIDE - Director of charter schools and Vice-chair of the Met Board
RIDE Lawyer
RIDE liaison
RIDE budget accountant
State administrator #1 - Department of Administration
State administrator #2 - State Properties
State Architect – Department of Administration

Architect Selection Committee 1999

Equity Officer – State Department of Administration
RIDE - Director of charter schools and Vice-chair of the Met Board
State administrator #1 - Department of Administration
State administrator #2 - State Properties

Minority Business Committee - 1999-2000

Equity Officer- State Administration
RIDE liaison - equity issues
State administrator #1 - Department of Administration
State administrator #2 State Properties
The Center Director (Minority Business Enterprises /Women Business Enterprise)
The Met co-principal

Providence Redevelopment Authority (PRA) Committee

Lawyer for State Department of Administration
Lawyer (consultant) for State Department of Administration
Department of Environmental management
PRA - Director of Providence Redevelopment Authority
PRA - Assistant Director of Providence Redevelopment Authority
PRA - land acquisition officer
PRA - site remediation officer
RIDE lawyer
State administrator #1 - Department of Administration
State administrator #2 - State Properties
Met co-principal

Evidence of the important role that the bureaucracy played in the design process is provided by the recurring use of standard operating procedures to defend against the pressures for design innovations presented by the Met program design. At a number of Design Committee meetings in the fall of 1996 when the South Providence site was discussed as the pre-selected site, there was disagreement about whether the site could be pre-selected. At this meeting, the Director of Career and Technical Education had anticipated the way the discussion was going to go and came prepared with newspaper articles and memos that kept both the Regents' Chairman and the Commissioner clear from harm's way. In the end, all agreed that a Request for Proposal (RFP) would be issued for the selection of a site. In this case, it was clear the long-term experience of the Director of Career and Technical Education around the political context of site selection and the project in particular avoided unnecessary delays in moving the project forward.

As stated previously, the discussion at Design Committee meetings about the Cranston Street Armory was a political issue that slowed the design work. The Armory Revival Committee was meeting with the Governor's office and the Department of Administration. These groups came up with the idea of taking state bond money for the Met project and solving their problem, as well as solving the issue of finding a suitable site for the Met. It seemed like a winning idea. These groups presented their ideas to the Design Committee in September of 1996. At this time,

the Design Committee members were more than willing to look at the Armory as an alternative. With the exception of the Met contingent, all were willing to have the Met go there, but this move into the Armory would run counter to the programmatic design of the school, which called for a series of small schools each in their own structure, not in one building. The entire committee with the exception of the Met was ready to have the Armory be the political solution to the site problem. The use of the Armory was rejected because of the intervention of the chairman of the Met's Board of Trustees.

A second sub-theme within authority is that relating to control. Many of the control issues overlap with the bureaucracy sub-theme, particularly as they relate to standard operating procedures. Purchasing furniture and equipment for the new Met school is an example of such a sub-theme. Many furniture items for state buildings are actually designed and built by prison industries. This business uses prisoners at the Rhode Island Department of Corrections to print materials, plus move and build furniture and equipment for the state. The prison also sells a line of furniture from selected furniture companies. State purchasing agents encourage building projects to purchase furniture from prison industries because it provides a means for the state to get its own funds back into the state system without creating purchase orders. In many ways, this circumvents the bidding process for furniture and equipment while also saving lots of time. In prior years before Prison Industries was in place, the state lost money when they went out to bid on furniture and computers. Aside from the Prison Industry system, there is also a list of vendors who have an established relationship with the State of Rhode Island. This makes it easier to process paper work.

The Met program design team believed that their innovative program design required different furnishings and equipment. The rest of the Design Committee representing the Department of Administration and RIDE told the Met staff that they first had to make sure they could not get their furniture and equipment from Prison Industries or from the vendors' list, and then they could go out to bid. All members of the Design Committee warned against trying to use the bid process outside of the state system.

Over the course of seven years, the researcher met with the head of Prison Industries about a dozen times. The Prison Industries director provided information and advice, based upon his many years of experience in the state system. He described how standard operating procedures served as controls on the design and construction process and allowed the state to exercise its authority.

The purchasing system in Rhode Island is cumbersome. First, the system had to be engaged and readied for the work. The top people at purchasing and budget had to be informed or else the funds might not get released. This blockage happens because the funds might not be readied for release. It was the state administrator's role as a representative from the Department of Administration to engage the system. Next, the Design Committee described and named 28 people in the "paper trail." Not only was it a long trail, but also along the way it was fraught with hazards. Someone may be sick. Someone may not like you. Someone may have other priorities. The list went on and on regarding how an order might get delayed. If written incorrectly or a department wasn't informed about the project, the purchase order could sit in a bin on someone's desk or get sent back to you.

The bureaucrats and state officials were terrified of the established system. In order to avoid many of these dilemmas, the common practice was to establish great relationships with the bureaucrats along the "paper trail" and literally walk your order through the system. This was the way things got done, and this was why the Director of Prison Industries was so confident of his authority and control.

State purchasing systems are put in place to insure that the taxpayers' money is well spent and accounted for. Although there is good reason to be accountable and frugal, the system appears to have great difficulty accepting any new work that is not completely understood by all in the process. Any new innovation or program that will be a one-time purchase will have difficulty with the system. It may be that even though the system wants to take it and has the responsibility, in many ways they are reluctant to take it in because of the one time nature of the purchase.

What the Met educators didn't understand and what they underestimated was the real complexity of working in the system. They were used to controlling the process of designing schools programmatically and implementing those designs. Most of the time, this meant they did not have to work with the system or be controlled by it. Now they were only the end users in a system that was set up to give them voice, but no legitimate authority, over the spending of the bond funds.

The first time the state went out to bid for a construction company to build the first small school, there were three political hurdles to surmount:

1) The State Director of Career and Technical Education advocated an approach to design,

land purchase, and construction that was inimical to the Met program design.

2) The turnkey contract between the state and the turnkey team was complex and there were few precedents for its development.

3) There were high expectations for the participation of minority contractors in the project.

This project was the first in the state that was to be a turnkey project.. The state administrator from the Department of Administration convinced the Director of the Department of Administration that the only way that this building's completion would keep up with the growth of the school was to build it as a turnkey project. This required a partnership with landowners, architects and a construction company. The Director of Administration was uneasy about this process because the state would lose the controls that it normally had. and can more easily monitor a project when the state "owns it." The Director of Career and Technical Education indicated that the state owns nothing until the building is handed over at the completion of the project. As the project unfolded, it took lawyers and state officials many weeks to insure there were safeguards and quality controls. The trick is for the turnkey team to keep to a rigorous time schedule in order to receive payment by the state in a timely manner, so they do not accrue interest on the loans they take out to do all of the land purchase and construction. The turnkey team was responsible for completing the work for the agreed upon dollar amount. Any costs incurred over the amount for whatever reasons were the responsibility of the team contracted to do the turnkey, unless the State Design Committee requested a change order. In the end, the turnkey team stated they lost money on the deal but there was never any way to check the claim. That is a drawback of the turnkey process.

The second issue for the Design Committee was developing a contract between the State and the turnkey team. For this work, the State administrator and the Director of Career and Technical Education called in the lawyer who wrote the contract for McCoy Stadium. This latter contract was a semi-design build project and somewhat similar to a turnkey. The major problem with it was that McCoy Stadium was built over budget. The plus side was that it was built in a timely manner.

The design-build contract was difficult to write and to have all parties reach agreement. The upfront nature of a turnkey contract, if not written correctly can have both sides fighting with one another very quickly. The idea was to give up the purchasing control without giving up overseeing the project. In essence, the turnkey team used their procedures, not the state's, and this controlled the pace of the project assuming they have better procedures. It also puts the accountability for getting the work done squarely on the turnkey team. In return, the amount agreed upon upfront is the amount the group will receive. It is in their interest to build quickly and not incur costs due to poor time management, labor, and purchasing materials. The notion is also to give the client what they want for materials and furniture, fixtures and equipment (FF&E).

The contract was developed by the Design Committee with their lawyers, but the State Department of Education also had their lawyers review the contract, and in the end, it was the Director of Administration who had to sign the contract. This made the work high stakes and added a political element to the construction of a school. It was now in the hands of the Director of the Department of Administration and anything that went wrong would reflect on his office, not RIDE. It also meant that RIDE lost more control over the project and the issue of capacity to do the work was put more in the hands of the Department of Administration.

The acquisition of the land at the South Providence site was another example of a political issue that involved themes of control and standard operating procedures. After the September 23, 2001 meeting of the Providence Redevelopment Authority (PRA) and Met's Design Committee to transfer the land from the Providence Redevelopment Authority to the Rhode Island Department of Administration, the Department of Administration's lawyers assured the Design Committee that by October 11, 2001 PRA committee meeting, the land would be transferred to the State.

Since the final issue relating to minority business participation was settled, it seemed there were no more obstacles in the way for a land transfer. Everyone was assured that the project would proceed with a closing date tentatively scheduled for October 15, 2001. On Friday morning, the researcher placed a call to the State administrator stating that upon review of the land transfer, the lawyer from the state informed him that the PRA added a clause that stated in the event the Providence Gas Company contested the payment of the gas line removal, the PRA would be held harmless for any financial responsibility and furthermore any legal expenses incurred by the PRA would be passed on to the State. This clause was not part of the land transfer until this final agreement time and the state was taken by surprise.

The cost for removing the gas line was over $600,000. Then there would be lawyers' fees on top of

the removal cost. The complexity of this problem is not apparent to an outsider. The issue for the state was more than just the cost for the Met. The City of Providence had an agreement with the gas company that lines must be moved if the city requests them to be moved. The State of Rhode Island only has this agreement with the gas company through the Department of Transportation for road construction. At this time, the state felt that it was not their project, but the PRA's; therefore, the PRA had the right to ask them to move the gas line. The gas company had been waiting for a precedent setting case to overturn this ruling so they could recoup some of their costs. For the gas company, the Met project became the test case, but the state adamantly refused to have it serve as a test case. In fact, the state told the PRA and the gas company they would walk away from the project if they had to pay anything for the removal of the gas line.

The land acquisition in South Providence started in October of 1998. At that time according to the agreement between the PRA and the State, the PRA was given eight months to assemble the land and do all the necessary site preparation and remediation. The gas crisis started in May of 1999 and it took a year and a half more to assemble the land than what the agreement stated. The gas crisis was one of the largest hurdles to overcome.

In the end, the state countered with a clause that allowed the project to move forward and to worry about payment at a later date. To the state and other parties, this meant that the issue was dead. In October of 2001, the land was turned over to the state and on November 5, 2001, the first construction meeting was held on the site.

Social Forces

Data from field notes, documents, and interviews revealed four social forces: language, relationships, community, and minority hiring. As might be expected, the latter three social forces were linked to political forces. Minority hiring was linked as well to economic forces.

Language. Language was a key factor in the translation process. Many similar terms were used to mean different things to different groups. As an example, the Met educators and the national architect wanted to have the flexibility to change the shape of the interior space with demountable walls. This would ensure that the school could change its space when the program changed. This type of flexibility was one of the learning signatures listed in the feasibility study. The rest of the Design Committee felt demountable walls would never be used because they could not think of one instance where demountable walls were moved in a building project they were installed in. On closer examination, it became apparent that the walls in these other projects were not put in by educators, but by the architects and policymakers, and therefore were never part of the educational programmatic design. This could be the reason they were never used.

It is also important to note that the new Met design includes new language for the physical design, as well as, the change in the physical design. Hence, there are no classrooms at the Met and therefore no codes that mandate the size of classrooms. Advisories, project rooms, conference rooms, meeting rooms, and commons are not listed in state building codebooks and therefore the shapes and sizes of rooms cannot be dictated by codes or the managers of the design process.

The local architect, the construction company, the Department of Administration, and State Properties defined durability as rigidity. This language translated into different materials. They preferred to build walls out of concrete masonry units (CMU's) instead of sheet rock. They preferred masonry exterior to clear story, curtain wall, windows, or aluminum. They preferred vinyl composite tile to carpet or rubber flooring.

In other instances reflected in the meeting's minutes, language changes started to occur. Rooms were no longer being referred to as classrooms and labs. They started to be called advisories, project rooms, meeting rooms and commons. The auditorium became a performance center. The gym became a fitness center. A school-based health center was added to the nurse's office area. Although the terms were used, it was difficult for most of the Design Committee to understand the interior needs for these spaces but once the language became common to everyone, the design of the spaces, the furniture and equipment needs were left to the educators.

In the end, the adaptation of the Met educators' language into the design meetings and the meeting minutes helped support the translation of innovative designs into facilities. The Met's innovation is manifested not only in architectural ideas interpreted and explained through language, but in taking those ideas and putting them into practice, as well as creating the physical architecture, the school facility. The struggle to get people to use the same language to mean the same thing in describing the Met facility was a difficult task, but as related in other cases of innovative design described in the findings, it is usually difficult in other school facility projects as well. The Literature Review revealed that the task is difficult enough for educators to talk to one another

about innovative design but when architects, bureaucrats, construction managers, educators, community people, and politicians start to talk about the building of the Met, many complications arose. A common and consistent language understood by all parties is key to the translation of a design to an innovative facility.

The jargon of education reform and innovation itself means different things to different educators. In order to further examine the complexity of language in the Met model, interviews were conducted with the Commissioner, the State administrator from the Department of Administration, the national architect, and a student from the Met were interviewed to get a small sample of the complexity language plays in understanding complex pedagogical designs. There were also direct examples from field notes and meeting minutes where language issues arose around the understanding of the design.

The language of the Met as stated in the feasibility study has remained constant over the past eight years. These learning signatures are a programmatic manifestation of the Met's philosophical mission of educating students "One Student at a Time" in a community of learners. The data from the interviews were analyzed to see if there was consistency between these learning signatures and what the interviewees were stating.

The data from the interviews of the Commissioner, State Administrator, national architect, and a Met student intern on the project was analyzed in reference to the language they used to express the themes around the forces at work in translating pedagogical and organizational designs into facilities. Since the role of the Commissioner was crucial to the translation, a more extensive reporting of his interview follows.

The State Commissioner of Education was a strong supporter of the Met. It was clear from the start that he understood the programmatic and physical design and the necessary linkage between the two. He understood the one student at a time philosophy to mean "the nature of the programming is individualized enough not just to mean me and my advisory but everything from the LTI mentor are folded in, in an individualized way." The Commissioner stated that the building has to be a community center; "it can't inadvertently be one." The context of a real world learning community to the Commissioner meant, "as they are out there, they are in a community. The more real time, they (students and staff) spend outside the door, the more real work they are going to bring back in. The Met is always in community - keep moving in that direction -no separation."

In an even more radical tone, the Commissioner believed that the Met facility should not be a substantial part of the investment. He felt that the Met should place learning centers in real world places and was more interested in getting access to real world places and share the burden with the real world players. "We haven't won the first part of the battle," the battle being to use already existing learning spaces in the community.

The Commissioner had a deep understanding of the Met exhibited by the language he used to describe both the program and the physical design. He insisted that this design would have roadblocks from the career and technical world, the regular world of education, and the political world. "They would call this too outside the norm. This isn't real. It is soft. It is not standards based. This was ideological, this interfered with the design."

Relationships. Understanding relationships, many of them long-standing, was a key to understanding many of the social and political forces at work. The politics of designing and constructing the Met was steeped in complexity. Rhode Island is not unlike a small town where everyone from the politicians to the architects, builders, bureaucrats, and educators all know one another. Almost all have had previous dealings with one another over building projects. They know one another's motives and styles for getting things done.

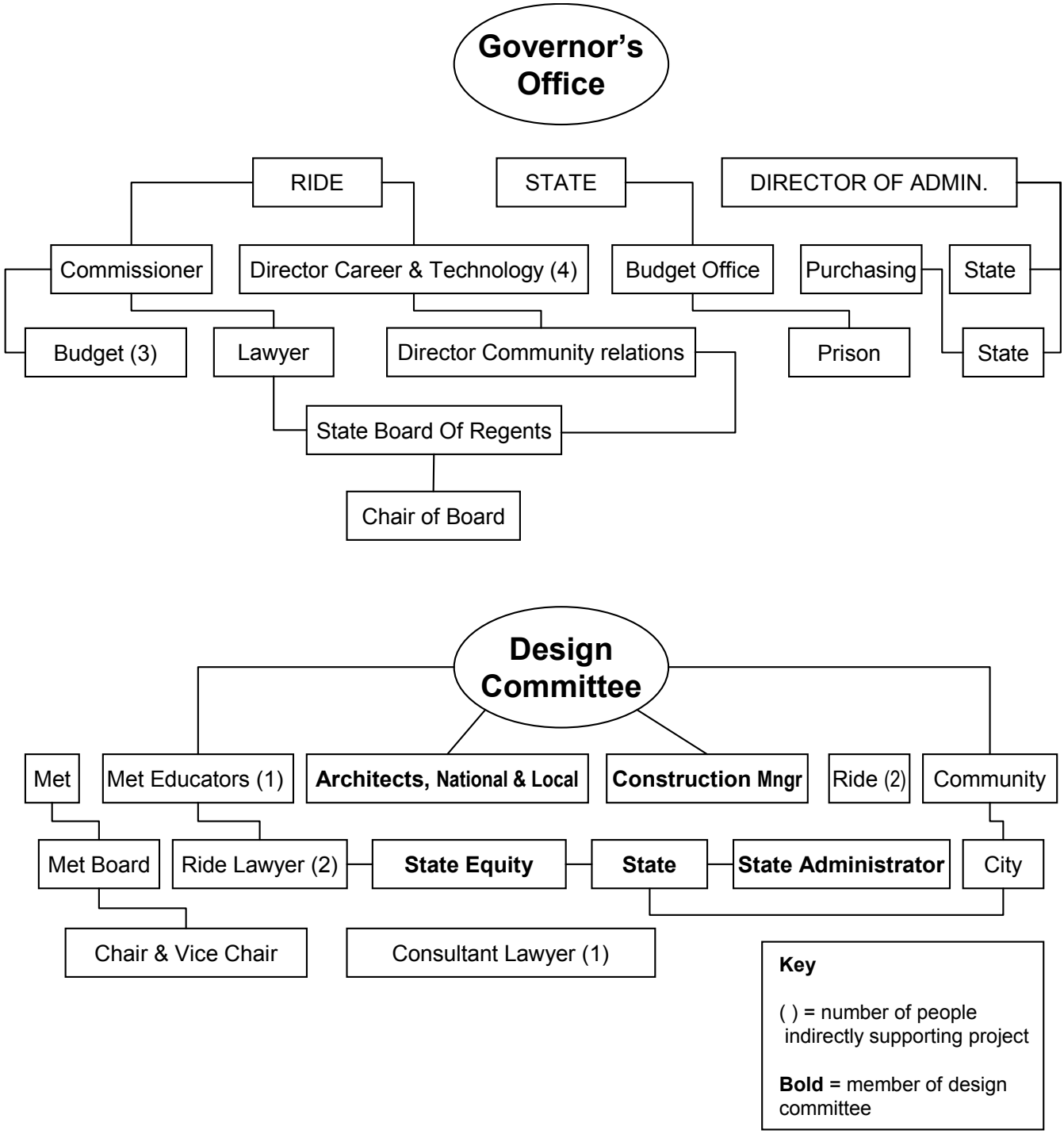
Over the course of this project, there have been long-term members of the Met Design Committee and there are members of the Design Committee who were temporary and peripheral to the day-to-day work of designing and building. The tables showing the members of the committees have been prepared to show who was involved in the project and how they report, meet, and answer to one another. Also, Figure 5 shows the roles and relationships of constituents involved in the decision on the Met facilities project. Over the years, these groups changed because some people retired and others replaced them or in most instances were not replaced.

In 1988, a story in the Providence Journal exposed a possible conflict of interest of the Mayor's with respect to the land in South Providence on which the chairman of the State Board of Regents wanted to build the Met.

An analysis of the data shows the dynamics of the relationships between the numerous constituencies involved in the process for designing and constructing the Met was extremely complex. Table 2 identifies the entities involved in making different decisions in the eight processes included in the design process. Each one of these processes had their own established

protocols, but since the Met was the first school built by the state of Rhode Island in over 20 years, no one really knew how to design and build the school.

Figure 5
Roles and Relationships of Decision-Making Groups



Since bond funds to build the Met were passed by the voters of the state of Rhode Island, this put a political context around all of the relationships between the state agencies that already existed. The bond committee had to approve the release of the bond funds. This put the Met project closer to the Governor's office than most other line items in a state budget. What made the Met project politically even more difficult was that it did not exist within one state agency but rather existed between state agencies.

Many political questions came up around the Met design:

- Did the voters really want a school like the Met?
- What happens if the innovators decide to leave?
- Has anyone ever done a design like the Met before?
- What happens if there are not enough bond funds to complete the project?
- Who is responsible for building the state school?
- Who is going to account for the bond funds?

Over the course of three years, it was agreed between the state agencies that the State Department of Administration would oversee the design and building of the project but that it would be still be a Department of Education school. The Department of Education did not have the capacity to do this project. Still, the Met project had to get approval from many masters. They included:

- The State Board of Regents and the Commissioner of Education
- The State Department of Administration and the Governor
- The State Properties Committee and the Head of State Properties
- The State Budget Office and the head of the budget office
- State Purchasing and the head of State Purchasing
- The Met Board of Trustees and the directors of The Met Center

Most of these approvals were official in nature, but the approval from the Met educators and its Board, although important, did not carry any official weight, because neither the Met employees nor their Board were officially a part of the State.

At times, it was difficult to understand how the state system was working to resolve issues around design and construction. At these times, the system stopped working until political or internal agreements were reached. One such example of this type of issue was the dilemma involving the payment for the removal of the gas line from the property in South Providence. The Providence Gas Company wanted to be paid $600,000 for the removal of a 23-inch gas line. The state refused to give the Providence Redevelopment Authority permission to pay this expense with state money. The issue at stake had to do with this being a precedent setting case between the state of Rhode Island and Providence Gas for removing gas lines in general. This political dilemma was resolved away from the design committee meetings without a dollar cost to the project, but it did cost the project up to a year's worth of time.

Another example was the land acquisition process. According to the timeline, land acquisition started in 1996 and the land did not become state property until November of 2001, five years later. The political entanglement between the administrations of the Governor and the Mayor was the root cause of the time delay in land acquisition.

Finally, the agreement reached internally by Department of Administration, Department of Education, State Purchasing, and Budget Office allowed the construction company to purchase all of the equipment and furniture for the school without going through the state purchasing system. This decision saved the project about a year in time, but cost time in the set up of the system to accept this procedure. These dynamics all took time to set up and time is money to a building project.

All of these political and internal solutions to problems allowed the translation process to progress. The Met was not part of any of the official decisions. No one from the Met signed off on any part of any of the processes. Some would argue that the state administrators were fearful of giving control to the educational innovators, but other state administrators argued that they were protecting these educators from a system fraught with great peril if you were not experienced in dealing with it. In either case, the Met directors and the head of the Met Board were able to meet freely with politicians and state agencies to educate, push, and converse about the vision for the school. Since they were kept at arms length from any official decision making authority, in essence the system freed them up to translate the vision into its programmatic and physical designs.

Another example of the wisdom of the decision to keep the Met at arms length from decisions was in the selection of who would be named the lead architect on the project. If it were up to the Met educators the national architect would be given that title but the state administrative team did not want an

architect from out of town to be selected as lead architect, and therefore had the local architect selected as lead architect on the project. This may seem a moot point, but in a political context where bond funds are used and architects are selected. the project could come to a halt quickly if funds were used for unnecessary trips or other charges of non-local architects. This is exactly what happened on another state building project in 2002 at the University of Rhode Island where an out-of-state architect was chosen as the lead architect.

In conclusion, the analysis shows that there is great complexity in the state system(s) but there are administrators who understand the system better than an outsider. What may appear to the innovators to be backsliding or working under an old mental model of a system or school may be administrators who are savvy in making the system work to the benefit of the project. Therefore what seemed like keeping the innovators out of the official process actually allowed the translation of the design to occur because the educators were freed up to do their work without the threat of being implicated in any political or systems issues. Furthermore, educators may want to keep themselves out of the official process to enable them to do the type of envisioning work of translating the design without fear of being accused of manipulating the process and getting involved in complex systems they barely understand.

Minority Hiring. The final issue of the turnkey process centered on the hiring of minority businesses. This sub-theme figured prominently as both a socio- political and a socio-economic issue. For purposes of this analysis, it is presented as a social force.

The President of Minority Business Enterprises (MBE) had met with the Met School design committee. He participated in design charettes and kept updated about the Met school project. He also had meetings with the Department of Administration and RIDE. The MBE always felt that since this project was going to be built in South Providence, the Black Contractors Association should participate in high percentages, not only in contracting to do the work and purchasing the materials, but also in getting on the job training. Over the two years of the existence of the Met, key Big Picture staff kept the MBE president apprised of the Met's progress.

At the Design Committee meetings, the MBE issue reached a point where the Equity Officer in the State and the Commissioner's representative were brought into the oversight of the contract. In the end, there was scant minority representation. During the construction project, a Providence Councilwoman, who is also on the Met Board, visited the construction site. She met with the Commissioner and the turnkey team. At any one time, only three minority workers were seen on the job. Only five percent of the work went to minority contractors; the goal was fifteen percent.

This first project had implications for MBE participation at the South Providence site. The meetings that occurred subsequent to the Peace Campus construction had strong MBE participation. The contract negotiations for land acquisition also included MBE participation. It was agreed that State Equity Officer would monitor the project and that an RFP approval team would review and approve all contracts for South Providence and include the percentage of MBE participation upfront.

In the end over 50% of the work at the South Providence site was awarded by minority firms. Also, over 25% of the over force was minority. These are the largest percentages ever for a public project in the State of Rhode Island. The social innovation of an innovative public school, with a commitment to minorities as well as a Design Team and a Department of Administration willing to move in a direction the State had never moved in before, set a precedent in the State. The Met educational facilities project managed to change several of the processes (i.e., turnkey, design-build, and MBE participation) for how the state had traditionally done business.

Economic Forces

Data from field notes, documents, and interviews revealed three economic forces: time, budget/resources, and efficiency/cost effectiveness.

Time. The time it takes to build an innovative design as a public project is crucial. Table 5 makes it obvious that the longer a school project takes the more money it costs. When trying to account for where the problems arose, it was found through a review of the timeline that most of the time lost was around the system readying itself to do the actual architectural and construction work. Because time is money to architects and construction companies, they tend to design and build as soon as they are hired. Conversely, they do nothing while

Table 5
Pro-Rating of Bond Funds

1995	$30,450, 000
1996	$31,972,500
1997	$33,471,125
1998	$35,144,681
1999	$36,901,915
2000	$38,746,011
2001	$40,683,311
2002	$42,717,477

waiting for the State to go through their selection and acquisition processes. They therefore tend to design and build the familiar, which makes them build to the design of their mental model of a school. There are two arguments the architect and construction companies would use to dissuade Met educators from the translation process into an innovative design. They are:

1) It takes more time to design the new model and therefore it costs more.
2) We can't take the time to design the innovations because we have to keep to "our" schedule to meet the deadline.

In both of these scenarios, these arguments put pressure on the Met educators to alter their designs to meet the normal protocols.

Given the time it took to work the system both to develop the capacity to build a school and to understand the innovative program designed, it appears that the persistent support on the part the Met educators was a key factor in the success of translating the innovation into a physical form.

Budget/Resources. In 1994, the bond for $29 million was passed by the voters of Rhode Island. When the $29 million is pro-rated (see Table 4) to the year 2002, when the bulk of the funds were expended, the chart reveals that to build a building in 1994 dollars would take $42 million. Simply, the passage of time and inflation put the Met at a loss for getting the dollar value of the original bond. This led the educators to design $13,000,000 of building space out of the design. There was never a thought in the minds of Met educators that the innovation would be compromised, but it is possible that, to save money, most educators, facility planners, architects, policymakers, state officials, and construction companies would backslide into a more traditional design.

Efficiency/Cost-Effectiveness. With the exception of the Met's own program design team, concerns for efficiency were paramount throughout the design process. The use of standard operating procedures was a principal means for controlling costs and increasing efficiencies. The Met design committee appeared to be more concerned with cost-effectiveness, that is, with ensuring that expenditures on facilities would support what they considered an effective program design.

Facilitators and Impediments to the Translation Process

The data shows that the translation process was supported and impeded in a variety of different ways. These facilitators and impediments were identified from a re-analysis of the data from all sources following the identification of the major forces.

Facilitators

Most of the key factors were supported by the Met educators and board members. The factor this constituency created was the strategy of "No backsliding." The Met community developed the no backsliding strategy as a way to make everyone in their own community stick to the new mental model that was being created for the programmatic design of the Met. This meant they were not going to move back into the old traditional mental model of a school with regard to the programmatic design.

When the Met started in 1995, it was not yet a school. Both the programmatic and the physical design of the Met was developed by the Big Picture Company. The Met educators then came out of this group. Once the programmatic design was passed by the State Board of Regents, the work on the physical design followed. Since Met educators subscribed to Frank Lloyd Wright's dictum that form follows function, their programmatic design translated into a particular physical design. This translation was developed by the Met community with the national architect in their Feasibility Study. This study was the first and only process in the array of design processes that directly supported the translation process. This study was presented to the Commissioner of Education, the Department of Education, the Department of Administration, and was approved by the Board of Regents.

The data listing the milestones in the Met Design and Construction timeline support the "no backsliding" strategy. Each time a problem arose that would have had the project backslide into the traditional design of a school, the Met educators held their position. Examples of this include:

- The hiring of the national architect;
- The forced move to the Armory;
- The designing and building of the Peace Street Campus as the first Met school;
- The acquisition of the land in South Providence
- The idea of consolidating the small schools into one large school on a campus;
- The mandate by the Design Committee to cut $13 million out of the project due to cost overruns in the design. The Met educators and the national architect managed to cut the funds and kept all of the programmatic features in the new physical redesign.

The data collected while interviewing key constituents found the following evidence for the no backsliding strategy.

State administrator:

- "Supporting the educators, interpreting the philosophy, no backsliding, educators at the forefront of the team"

National architect:

- **"**What I just did was really the Met's program. The foundation is the Met program. The form is just the mirror of the way you guys do business."
- "Educators in the forefront"
- The philosophy of the Met notwithstanding all of the things, the obstacles, that had to be overcome. The clarity of the concept and our commitment."
- "We're not going to take no for an answer even if our primary consultant is trying to encourage us about movable walls. No plain vanilla."

Commissioner of Education:

"The building has to be a community center. Iit can't inadvertently be one."

"Personalization - as physical design - This is our home space - the nature of the programming is individualized enough-- not just me and my advisory but it is everything from the LTI mentor folded in,in an indivdiualized way.

Defeating the mausoleum image - It isn't huge and doesn't end up having the corridor but you can even make that into an intimate place, not being trapped in the mausoleum."

- "Don't wait till you have the building - The instinct is to open now. The most critical fundamental decision."

Met student:

- **"**A lot of pressure and people persisting on what they want."
- "As a student being able to participate in the design and have the student voices heard at these meetings. Not just staff deciding what is going into it."
- "Of course, everything our programs are should be in there."

Furthermore, Table 6 lists the innovations that were designed into or out of the project. Upon review of this data, it is evident that most of the key design elements around the Met's programmatic design were included in the final design. These include:

- Small schools;
- Internal space such as advisory, project rooms, meeting rooms, commons;
- community spaces - performance center, school based health center, fitness center, and rock climbing wall, TV studio, and community fields.

Some of the design elements that were lost were important but not
crucial to a facility that supports an innovative program. These included:

- Placement of small schools on the site;
- Language from town square to campus;
- Geometry of buildings;
- Elevations of buildings;
- Exterior materials of building.

Once the Met innovative model had been designed and built, and was slated for replication, the review of the case studies of schools like the Met shows these schools are having an easier time translating the design to a facility. As the national architect stated, "I would redesign what it looks like, not redesign the program. The form is the mirror of the way you guys just do business." In Federal Way and Detroit, the following features were designed into the facility: small schools of 110 students; internal space such as advisory, project rooms, meeting rooms, commons.

Table 6
Design Elements Included or Excluded from the Project

Standard Operating Procedures	In	Out
Materials (exterior) – "Skin" of the building		✓
Lights (interior)		✓
Adaptations	**In**	**Out**
Innovative Project Processes • Turnkey (Peace Street Campus) • Design and Build (Public Street Campus) • Minority Business Enterprises • Programmatic Design	✓	
Demountable walls	✓	
Advisory Rooms	✓	
Project Rooms	✓	
Commons	✓	
Meeting Rooms	✓	
School Based Health Center	✓	
Rock Climbing Wall	✓	
Elevation	✓	
Geometry of building		✓
"Sine" Wall		✓
Community-Based Outreach Space		✓

Not only are the design elements being translated, but the buildings are going up faster and cheaper. Detroit was built at $72 per square foot; Federal Way was built at $120 per square foot.

Once a new mental model of a school that has translated pedagogical programs into innovative facilities has been built, then prospective clients can understand the design through their visit and can take that model and replicate it. Through the leadership of the Met educators in the design process, the mental model of their own constituents involved in the design and construction process was altered, and this allowed them to rebuild that design on the Public Street site. As the national architect stated, "The educators brought the clarity of the concept and their commitment. They had a certain stamina that they brought to the table. They were not going to take no for an answer, even if our primary consultant is trying to discourage us about movable walls. They weren't going to settle for plain vanilla."

Impediments

The data reveals many difficulties impeding the translation process. The design committee and their relationships are charted in Figure 4 on page 126. These individuals and their organizations comprise the design and construction process team. Upon review of the timeline, it was found that the Met design process was not one design process, but actually eight processes. They are:

- The educational programmatic design process.
- The architectural selection process.
- The land acquisition process.
- The architectural and engineering process.
- The construction selection process.
- The construction process.
- The awarding of bids process.
- Project management process.

Each one of these processes was directed by a different manager. All reported to the Design Committee headed by three authoritative bodies - the Department of Administration, the Department of Education, and the State Properties Committee. Respectively, these entities were all responsible for reporting to the Governor and his Director of Administration, the Commissioner of Education and the State Board of Regents, and the State Properties Committee. At the appropriate time, State Purchasing and the State Budget Office both had final input into decisions regarding how these eight processes were to work. Although the Met was represented at every committee and had a strong voice in the process, the Met co-director (the researcher) never officially signed off on any part of the process. The Met was considered the end user. The Met co-director reported to the Met Board of Trustees.

The complexity of the cumulative design process contributes to impeding any translation of an innovative design. There are many people who are not involved in the day-to-day work on design. These people have a difficult time understanding the design and the language used to describe it. These constituencies also are carrying around an array of different mental models for what a school should be, both programmatically and physically, and how much that should cost to build.

Each of the processes in the design and construction process mentioned above had special institutional protocols to follow. It was difficult for the managers of these processes to change their process to conform to an innovative design. For example, the architectural process took longer because the architectural team selected met the criteria for having an experienced nationally known educational architect, as well as, an experienced local architect. Both architects had a different subset of skills necessary for carrying out the project innovation. The selection committee had to be educated about the project so they were able to base their decision not on lowest bid, but on understanding innovative pedagogical design.

Once the architectural selection process was completed, the architectural design process ran into a variety of difficulties, most prominent being the difference of opinion about the nature and degree of translating the innovation. The national architect pushed the new mental model and the local architect focused more on local code and design issues, which pushed back on the new mental model.

The land acquisition process impeded the innovative process because of an old political disagreement between the Mayor of Providence and the Governor of Rhode Island. Examples of this disagreement resulted in the State Department of Administration and State Properties Committee trying to resolve the land acquisition issue by: putting the Met in the Armory; going out for Requests for Proposals twice to find another suitable plot of land for the Met; and finally developing an agreement with the Providence Redevelopment Authority to acquire the land in South Providence. This political conflict cost the Met project time and money.

It was at the construction selection and construction processes that state Department of Administration, State Properties Committee, and the local architect implemented the innovative turnkey and

design build construction processes. Although these processes took longer to clear through the state bureaucracies, and the state lawyers, in the end, they supported the innovative design of the Met by allowing the construction company to purchase all furniture and equipment instead of going through state purchasing and getting tied up in the bureaucracy for literally years. One other benefit of using the design build process was to allow the construction company more autonomy in putting bid packages together. This allowed more minority participation and in the end, the Met project had the highest minority participation ever for a state project, over 45 percent.

The mental model of a traditional high school was not the only impediment to the translation process; the mental model of the design and construction process was also a serious obstacle. Examples abound in the data around the presence of, and the impeding effects of, these traditional mental models among the constituents.

The Director of Career and Technical Education never went far enough with the Department of Education or the State Board of Regents in pushing the Met design. He would refer to the Met as part of the Career and Technical system. To the Director the Met was not a new iteration of a high school that retained only the best aspects of both an academic and vocational high schools, while at the same time inventing new programs and subtracting the parts of the design that were failing students. There was always backsliding into building one large high school, not a series of small schools. The Commissioner wanted the schools on one campus, not spread out into the community as satellite campuses. The Department of Administration, State Properties Committee, and the local architect designed and built a 26-foot ceiling at the Peace Street campus, not for aesthetic reasons, but because they felt that in the future when and if the Met failed, this building could be made either into a larger school or some type of state office in the community. The local architect also redesigned the schools so they would be a campus rather than a town square. This pushed the schools closer together for security reasons, but also changed the language and idea of the sense of community for the exterior design and landscape.

All of these impediments add up to overwhelming odds against an innovative design being translated into a facility. It was in the nuances of the day-to-day work of the Met educators where the Met's innovation was successfully translated into a facility.

Principles and Practices: Design Accommodation

This section addresses the second major research question and the sub-questions:

2.0 How do prevailing concepts and processes of school facility design accommodate the translation of innovative pedagogical and organizational school designs?

2.1 How does the Met's program design align with prevailing ideas of school architecture and construction?

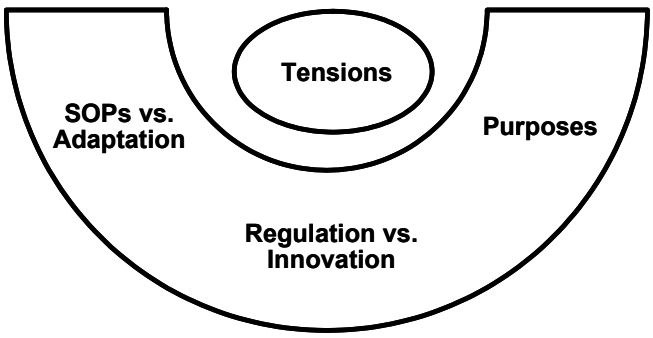
2.2 How well to prevailing school facilities design processes accommodate the essential Met program design components?

2.3 What aspects of prevailing school facilities design processes impede or facilitate the translation process?

The data reveal that there were substantial and significant differences between the ways that architects and Met educators approached both programmatic and facilities design. While the previous section presents an analysis of the data to identify forces at work on the translation process, this section examines the data sets for insights into the nature and scope of tensions and accommodations in prevailing concepts and processes of school facility design. Two specific sub-questions were also addressed.

As displayed in Figure 6, analysis of the data from all three sources – interviews, documents, and events – identified three sets of tensions between the program designers and program design processes and the facilities designers and facilities design processes. The presentation of data is organized in terms of these tensions. The analysis then addresses the question of the nature and scope of accommodation made by the facilities designers for the highly innovative Met design.

Figure 6
Tensions between the Program and Facilities Principles and Practices



Three sets of tensions were identified: 1) purposes, 2) innovation vs. tradition, and 3) standard operating procedures vs. adaptation. The first set of tensions related to the differing purposes that the program designers and the facilities designers saw in the overall translation process. The two groups had differing goals and motivations.

The second set of tensions dealt with the differing views of the benefits of innovation vs. tradition. The facilities designers were reluctant to buy into considerable innovation because they viewed it as conflicting with one of their principal goals – efficiency and economy. The third set of tensions dealt with the reliance on standard operating procedures vs. a disposition to adapt to address the special requirements of the Met's program design.

Purposes. The mental model of the career and technical world, the traditional school world, and the political and standards based worlds could not accept a Met either programmatically or as a facility. It was not something they had done, nor was it something they wanted do. It is a given on any project that there will need to be an alignment of groups around a common purpose for an innovative programmatic design to be translated into a facility. Along the lines of not being able to accept a design because of being trapped in one's own mental model, Larry Rosenstock, the founder of High-Tech High in San Diego, recounted an experience of being on a panel explaining his school when someone from the audience angrily responded, "You can't do that, that's impossible to do, and besides we are already doing it." The confusion of educators around the ideas and language of school reform is a serious gap in attempting to design innovative facilities when people feel there is nothing new to invent or improve upon because they can't allow themselves to see another mental model.

As noted earlier in the history section, many of the members of the Department of Education had this same uneasy reaction to the Met. Their intentions of changing the system and/or regulating the system were not in alignment with the innovative programmatic design of the Met. The Met's design is driven by student learning, One-Student-At-A-Time, and the staff at the Department of Education were driven by efficient ways of regulating and standardizing instruction. For many there was no common purpose. The Met did not support their work and they did not want to see it succeed.

In the political arena of Rhode Island, the Commissioner insisted that even though the Governor's Chief of Staff loved the Met and was an excellent advocate, the legislature never did. They were more politically tied to the Met's purpose around the impressions of teacher's unions, the work for the construction trades, and the impact of the school on the state budget. The Commissioner felt what countered these interferences were the instincts of the co-directors to "not wait till you have the building. The instinct to open now was the most critical fundamental decision." Without the push to open without a building, the Met would be a memorial of concrete to someone. This is what this would have been."

The fundamental purpose for an experienced Commissioner was not to have the bond issue drive the design and be the motivation to build a school, but to have the design drive the building and determine how the bond funds were spent. This meant that the innovation of the physical space was not contingent on funds, but on relationships developed that made the Met part of the community. It also means the school building design was contingent on the places where students have their internships and do real world learning. The innovation of the facility hinged on starting and doing the program rather than on focusing

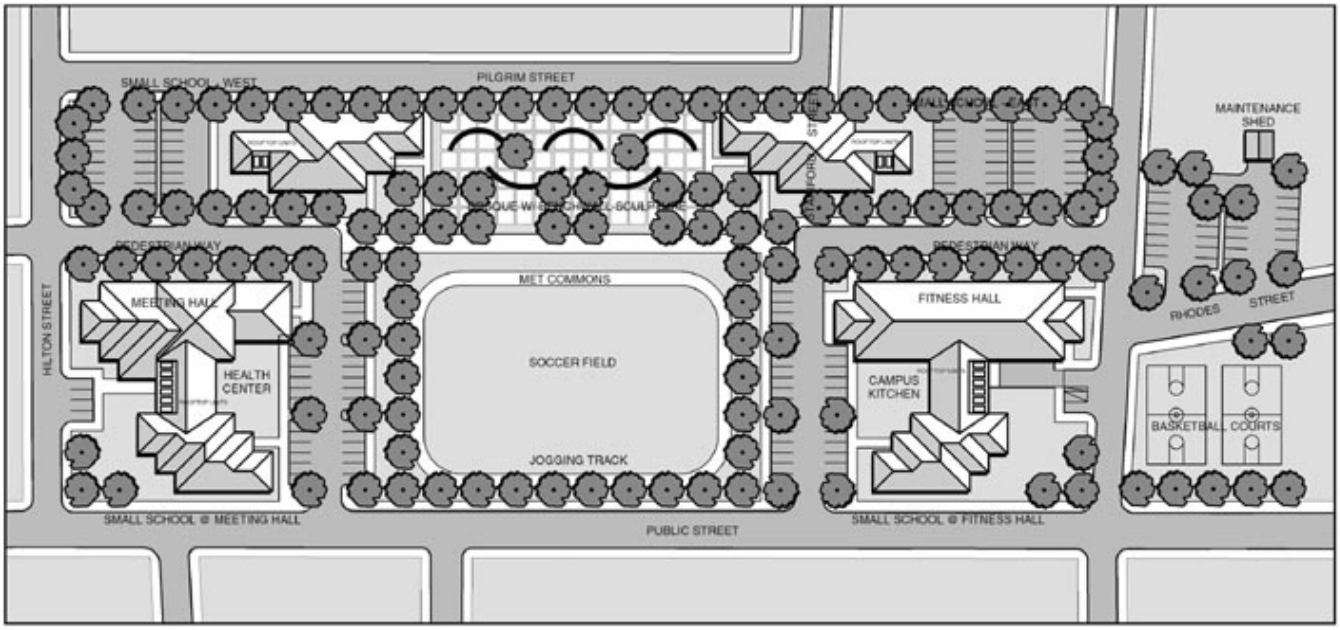
Bird's Eye View of the Met Campus

on expending bond money to get the building built. Without a program, there would be no innovative design. The Commissioner always saw the Met's bigger purpose as a way to drive innovation in a state and nation sorely lacking in practical innovative designs.

The two architects selected to design the Met, a national architect from a New Orleans based firm and the local architect from Rhode Island, had strikingly different purposes regarding the design of the Met. The local architect had worked with the national architect in New Orleans on an innovative housing project. This collaboration was one of the main reasons this team was selected. The Big Picture and Met co-directors did a national search to find one of the most innovative architects to design the Met and selected the national architect. The State Department of Administration was reluctant to hire someone from out of state and sought out a partnership. It was only natural, but just a coincidence that the national architect had previously worked together with the local architect.

At the selection meetings, the national architect did the presentation for the group but after the meeting in a side conversation at the Department of Administration, it was decided that the local architect was to be the lead architect even though the national architect was charged with the major portion of the design. In the beginning, it appeared that this was a good arrangement since the strengths of the two architects complimented one another-- the national architect being a visionary and the local architect attending more to nuts and bolts. But as in many cases, a strength can also be a weakness and during the design process, the architects argued over ideas, process, and the language of innovation.

The strength of the national architect was to work with the community and design what they wanted their school to be by taking their ideas and translating them into physical space. His process was slow and thorough. He tended to learn from the project, pick up its language and ideas and incorporate that into the design. For example, at charettes the national architect would probe and question about the feel they wanted a particular space to have. "When you first walk into the school what do you want to see? What do you want it to feel like? How do you want it to represent you?" Responses were evaluated by the whole group and space was designed to accommodate what the group came up with. For the entrance area of the small schools, the groups came up with exhibits and actual products of student work on walls and pedestals. The entry way is a cross between a hotel lobby and a home. It doesn't feel or look like a school. There is a large space where all students and staff can gather for morning meetings. There are comfortable chairs and places enough for everyone to see and hear what is going to happen. After the morning, meeting space can be rearranged for small group meetings, individual



The Metropolitan Regional Career and Technical Center
Concordia LLC/Design, Rowse Assoc./Arch of Record
DesignShare 2003 Merit Award. Plans and details at:
http://www.designshare.com/Awards/2003

work, snacking at booths along the walls. The space begins to feel like a student union at a college. The space maintains a high degree of flexibility. There is a warm welcoming feeling for students, parents, and any guests and visitors. During the interview the national architect stated, "The form is just the mirror of the way you guys just do business. Educators should be in the forefront of the design." For his part, the national architect wanted to design a building with more art, more geometry, more public art and a 'green building,' " (note: a green building is an architectural term for a building using environmentally sound practices). He wanted to "focus on student's interests, bringing every resource possible to support these interests including the physical space that supports the concept of each student learning the way they want to learn."

The design committee minutes reveal that the local architect wanted the process to move fast and efficiently. He controlled the minutes of the meeting and stated things were too costly to do and would take too long to design. The local architect felt the exterior the national architect had designed was too distant from the community. The architects argued about everything from elevations of the schools, exterior materials, and shape of the buildings. The mental model the local architect had for a school was not fitting into this new design. At design committee meetings, he would argue for vinyl tiles to the area because they were more durable and were easier to maintain than carpet. He argued about the wall materials, preferring concrete block to sheet rock or de-mountable walls. He was looking at costs and construction. He was building into the design his definition of durability without flexibility.

For the architecture of the building, the national architect wanted nooks and crannies for students to find quiet space to work in small groups or by themselves. He wanted a particular geometry to the school that would make mathematics come alive from the building design. He opened the school grounds up, using the metaphor of a town square. He had all of the buildings face toward the square. There were no fences on the periphery of the school. Inside the building, the local architect wanted clear lines of site and means of egress for safety and security, taking the design back to the look and feel of long corridors in schools.

In the final phases of the design process, there were instances when the architects had the opportunity to show their understanding of the language of the pedagogy put into innovative design. In early June 2001, the Met was told by the design committee that the project was $13 million dollars over budget and that 30,000 square feet of space needed to be cut from the project. It should be noted that in Design meeting minutes from August 11, 2000 Item 0801.01 stated previously the project was thought to be $1-1.5 million but the project is more like $2-2.5 million over. It should also be noted that until the construction manager came on board there was no clear way of estimating the total cost of the project. It was the work of the construction manager to take the architects plans and prepare detailed bid packages and estimates for the cost of the job.

MET East Small School

At this point in time, the Met took on full responsibility for redesigning the space with the national architect and a member of the construction company. No one from the Department of Education, the local architect or the Department of Administration

joined these meetings. In the end, the entire Met Central building was cut. The fitness center including the rock wall, TV studio, performance center, kitchen, and the school based health center and community spaces were all downsized but kept in the project. This team managed to take nearly all of the innovative design features of the small schools and incorporate them into the existing space without losing features like commons areas, demountable walls dividing advisory, and project rooms. It became apparent that without a strong mental model from the educators and the national architect, and a theme of no backsliding, the project could have been turned into a traditional school.

The next week, the redesign was turned over to the local Architect to redo all of the architectural and engineering drawings. At this time, there was little input from the design committee, and the local architect team drew. We were told that this was because we were under huge time constraints to make deadlines so the project would not fall behind. The architects also developed another contract for the redesign and this took funds from the project. As we moved out of summer into the fall of 2001, the land acquisition took months longer than expected.

At the same time of the redesign, the local architect with the support of the Department of Administration and RIDE made an architectural decision and turned the town square into a campus. He moved the two small schools in the rear of the site closer to one another. He changed the entryways so they did not face the square. These changes may seem like a small feature but the Met co-director insisted that the schools be as far apart from one another on the site as possible and that their entrances face the square.

This design change happened in a very controversial way. In July 2001, the Met co-director took a week off for a vacation in the summer but even though he was on vacation, he joined in on conference call for a design committee meeting at 3:00 am. He was told beforehand by the local architect that decisions were going to be made and that if he missed the meeting the Met's input would be lost as well. These changes to the design that were going to be discussed were presented as options with the condition that the Met educators get back in a timely manner about agreeing to the changes requested by the local architect. When the Met co-director got back from his vacation, he was informed the changes had already been made even though both the Met and the national architect disagreed with the changes the design committee was making. This is a prime example of how difficult it is for innovation to drive a project and change the model. Any chance to backslide is taken seriously by the forces at work to maintain the status quo.

MET West Small School

The language of the town square and campus may not sound like a huge issue but it changes the intent of how the school is part of the community. Earlier in the project, similar issues occurred over other design features. The exterior material of the building and the exterior design were hotly debated. The national architect wanted a school that would look like

a school of the future. He did this by using materials that offices converted from older mills would use. Lots of glass and geometry were built into the design. This is similar to the mills and the houses in the area. At the same time, he wanted to maintain the integrity of the community by using similar elevations and opening up the school site to the community. The local architect insisted that the building materials be brick and lose the reveals and any angles. In the final design, the material became brick, the windows were downsized, the elevations and geometry of the buildings were scaled back, and the angles were cut back. The exterior design was compromised because the design committee members could not give into their notion of what a school should look like.

In design meeting minutes from June 13, 2000, the local architect stated that the Met was being designed "to be intentionally different from other schools." He felt that the design was becoming a statement as to what the school represents even if the public does not like it." The local architect stated that the national architect's design "is not energy efficient, does not fit in to the local aesthetic environment, and is extremely difficult and costly to build." Furthermore, if other schools do not look like this one why should the public spend time designing something and using materials they will never use again? These exterior design innovations were hotly contested and in some cases compromised, but the Met educators never caved-in.

What the Department of Administration administrators and the local architect team considered innovative was the lighting that the electric company offered. They wanted to make the Met a model school for new types of indirect high efficiency lighting and were willing to rebate the additional cost incurred of installing this type of lighting system. The local architect and the Department of Administration saw this as innovative and cost effective. It is the type of innovation they could transfer to other school projects. The state administrators saw a cost-saving innovation and something they could report back to their directors as a way that they negotiated these lights from Narragansett Electric. This innovation fit the traditional mental model.

Efficiency, the status quo, cost, and transferability to other state projects were purposes that drove the legislature, the department of administration, and the local architect. The programmatic design of the Met is what drove the Met educators, the national architect, and the Commissioner. The purposes of these groups differed dramatically and it was up to the Met educators to create a climate and environment where their programmatic design was driven through these different political, social, and economic forces at work to translate the Met's physical design into facilities.

Innovation vs. Tradition. The Met's programmatic design does not align with prevailing ideas of school architecture or construction. It is a highly innovative design. Except for the redundancy in the design of the small school where the architects were building four similar small schools, the normal design and construction processes around economies of scale were useless in designing the Met. One reason the national architect was hired was because he had developed different processes to design schools architecturally. Unfortunately, ego, bureaucracy, time, distance, cost, and procedural constraints prohibited the full use of his design process and his innovative services. What did emerge unbeknownst to any who started the project was an integrated albeit cumbersome approach to design and build schools. This approach integrated the eight processes through a shared language and understanding of the programmatic design.

The timeline reveals the counterbalances between the old and new mental models the people in the system were struggling with. The move back to the Armory, and the move to seek Requests For Proposals for the site were backslides that failed to make the Met into a large high school and thereby backsliding it into a design and construction project that was a known model. On the other side, the moves to build the Peace Street School first, and get the support of the Providence Redevelopment Authority to acquire the land in South Providence were steps to translate the pedagogical design into facilities. In the end, the no backsliding approach by the Met supported the state administrators in their effort to seek new ways of building schools either through design build or turnkey processes. In turn, these methods helped support the inclusion of more minority participation.

The research investigated the alignment of the Met's program design with prevailing ideas of school architecture and construction. The Met educators' vision for the programmatic and physical design was passed by the State board of Regents in 1996 and approved by the Governor and the State Legislature in that same year. This meant that the state administrators had to design and build a school based on the Met's program. In order to do this Met educators set out to educate the system for this new mental model.

The fear of the state administration and the local architect was that the Met School design conflicted with the long held belief both in school architecture and school construction that there are economies of scale in building large comprehensive high schools. This way of designing and building is

something both the local architect and the construction company knew how to do and were prepared to do. They had standard operating procedures and language for building these large schools.

In their programmatic design (Littky & Washor, 1996) and in their feasibility study (Bingler, Littky & Washor, 1996) the Met educators and the national architect argued that there are penalties of scale (Bingler, Littky, Washor, 1996) that are reflected in designs of large schools. They include:

- more costly to run administratively;
- more costly to keep clean;
- more costly to secure;
- a lower attendance rate
- a higher dropout rate

Since the Met's programmatic design and feasibility study were passed by the State Board of Regents, that left the expertise of this design in the hands of the educators and the national architect. The design charettes were conducted to further develop the Met's learning signatures into a facilities design and learning environment. All constituencies of the design committee were included in these charettes. This helped all the constituents understand the programmatic design and the language of the Met.

Because the Department of Education lacked the capacity to manage the design process, it was left more open than it would normally have been. This helped the Met and the state administrators change the ideas of how a school gets designed and constructed. The Met educators benefited because they developed the language and the design that was then mandated to be built. The state administrators benefited from this turn of events, because they wanted to build things differently. They wanted to adapt practices and processes that would expedite design and construction but still be in the state system.

It was much easier to convince the design committee of the educators' needs because the educators had lived in the school that was built by the same team two years earlier at Peace Street. Many of the features that were being redesigned were features insisted upon by the national architect and the design committee. In Figure 9, a check appears next to the design elements that were put in by the national architect and the design committee. It should also be noted that the Peace Street School was built as a turnkey project, which gave much of the control and final approval over to the architect and builder.

They were interested in developing new ways to acquire land, and design and construct other building projects. Through this project, they were able to do the first turnkey and design-build project in the state. They also had the highest percentage of Minority Business participation, over 50%. The question becomes did the Met innovation allow and/or push the state administrators to do things differently? These findings suggest that if educators don't backslide on their design and understand the workings of the design and construction processes, then they can get their innovations built by creating an environment that is a win/win for them and the administrators, architects and construction companies.

One significant innovation in the State of Rhode Island's policy was to set a goal of 40 percent Minority Business participation for this project. This was the highest goal ever set in the state for minority participation. The head of the MBE, negotiated this goal with the State administrators and judging from the debate at the construction selection committee, the award for the construction manager hinged greatly on the MBE issue. For the project, the goal of 40 percent minority business participation meant a possible increase in prices, because minority businesses are smaller and the bids put out by the construction companies need to reflect their size, if they are to reach their goal. Furthermore, more minority business participation may mean delays in the project, because these smaller companies take a longer time to complete a given part of the project, simply because they have smaller workforces.

At Design Committee meetings, the minority business issues related to time, cost and meeting the 40 percent goal. In most cases, the issues were ironed out with the agreement, including the State Equity Officer that the state would make decisions to use companies for the work that took into consideration time and cost factors as well as minority participation.

The Equity Officer and the Rhode Department of Education appointee agreed to the Department of Administration's request. It seems that there is a paradox being set up -- between hiring minority businesses that cost more and take more time to build and having extra funds for the needs of the school. In essence, the needs of the community and the needs of the school seem to collide. The process for awarding bids showed this was not the case. The awards came in under bid and minority participation came in over 50 percent. What the Design Committee and the construction manager did create was an RFP process that met the demands and needs of all. This process had a different overview. The awarding team consisted of people who were intimately involved with the complexity of the Met. The Equity Officer, the RIDE, Met, Department of Administration, and State Properties Design Committee members approved the

awards. This process challenged the old notions of cost and time factors when hiring minorities. The simple procedure of using staff who already knew the project allowed the community and the Met to achieve wins in a situation where they may have been pitted against one another.

There are many other hazards and obstacles in the systems of state bidding and purchasing that lead to the demise of many innovative ideas becoming a reality. Examples of these are numerous. As mentioned previously, the State of Rhode Island has agreements to purchase items from certain firms with approved ratings. Some of these agreements are through Prison Industries. Both the state and the companies are locked in around the quality of the product they will receive because these companies make their products specifically for states and large public entities. Conversely, there are also many more companies that won't deal with the state because they might not get paid for over a year. For the Peace Street site, the Met used bond funds to purchase a lawn tractor, the tractor was delivered, and the hardware store didn't get paid for 11 months. Our computer vendor Unicom was not paid for over six months even though this was a sole source order. These are examples of the limits put on an innovative project to purchase the materials and equipment needed for the innovation.

Standard Operating Procedures vs. Tradition. Many innovative educators are familiar with creating and developing innovative programmatic designs. Ted Sizer, chariman of the Coalition of Essential Schools and chairman of the Big Picture board has always called the work of implementing the innovative school design “a messy business." Most reformers figure out a way to structure their design so that it constantly changes as children and societies do. In building a building though, there are strict processes that are followed and set up both by the Rhode Island Department of Administration and architects and construction companies. Money and time are two keys factors that drive decisions in both the design and construction processes but there is also the process itself that puts up barriers to innovation.

The local architect stated that almost all construction projects are managed in the same way. Construction companies have made their fortunes creating and sticking to a design and construction process that innovates and changes mostly as a function of technology and not as a function of a different way to manage a project. For example, during the bid process the winning construction company stated that it had the latest software for project management, e-mail for communication, and the ability to use real video cameras that can be placed on the building site to allow corporate headquarters to manage the project in real time from their offices, which are sometimes across the country. These are examples of the technology innovations in the construction process. On the other hand, there is little innovation when it comes to modifying this construction process. The construction manager's and architect's responses to the Met as the client range from "we'll try and accommodate you" to "we cannot make any changes on this item without a costly change order" to “you should have told us sooner we can't change anything now.” During construction, their process is what takes precedent in almost every decision that is made. This process puts the authority in the hands of the architects and construction managers and has the potential to stifle educational innovation.

Contingency funds set aside for emergencies and change orders are normal set-asides in a project but according to a local developer, these funds are usually used up before the building foundations harden. This leaves no money for many innovations that were part of the original design. In the case of the Met, this meant the potential elimination of a rock-climbing wall for urban youth, more innovative furniture and fixtures, high-end computer technology and flexible walls. It is a game that is played between the client, the state, and the construction company and architect.

Earlier in the Met design process when a list of add alternates were developed, the client was told that the innovations might get into the design but other parts of the construction and design process started taking precedent. It puts the design of the school back into a known mental model that is all too familiar to traditional thinkers. This entire process puts the educational innovators at a disadvantage.

Many times the Met tried to convince the state to go outside their regular purchasing system but there were many disincentives. For example, it took time to convince state purchasing of the value of quality products. The system felt it needed to set up an RFP process so anyone could have a chance to bid.

One of the state administrator’s many tasks on this project was to, as he would say, "grease the wheels" to make things ready for the system to receive them. The State administrator had very realistic expectations about what the Met was up against in trying to get a school built in a system that doesn't build schools as their work. He was also very concerned about the innovative nature of the work and the capacity of the state to understand the design and process. The State administrator remained supportive of the Met's programmatic and physical design but he was a realist. He believed that "the system works - set

up everything according to the system and it will take it."

Accommodation

The research investigated the ways in which prevailing principles and practices of school architecture and construction accommodated the translation of the Met program design. Table 7 identifies the design innovations that were included in the project.

Table 7
Chart of Design Innovations

Social
The role Minority Business Enterprises (also economic)
Student and community voice:
1. Charettes
2. School Based Health Center
3. Rock Climbing Wall
4. LTI at architect
5. Community liaisons
6. Tree planting grant for the neighborhood
Language
Flexible space
Names of learning environments
1. Advisories
2. Meeting rooms
3. Project rooms
4. Commons
5. Fitness Center
6. Community Performance Center
7. Community field
8. Community Television Studio
Political
Design and Construction Process Changes
1. Land acquisition
2. Architect selection
3. Approval by the State Board of Regents of the Met design
4. Turn key process
5. Design build process
Economic
Small schools – 110 students, square footage
Minority Business contractors and workforce Materials:
1. Demountable walls
2. Furniture
3. Technology

Each and every innovation was approved at design committee meetings as noted in the minutes, but this does not mean that all the constituents personally agreed they were essential to the Met pedagogical design.

In most cases, after years of working together the design committee let the educators make the pedagogical design decisions around the design. Disagreements at the design committee meetings took place in more subtle ways. These disagreements were mostly centered upon the size and shape of the small schools and the definition of interior spaces like advisories, and project rooms.

One of the factors that helped architects, state administrators, Met educators, and the community make decisions about the Met campus schools was the design and construction of the first small school at Peace Street. The Peace Street small school design was put together by the same design committee that received the award for Public Street. This school was open for two years and the following data helped inform the design of the next phase of the Met.

- Advisory rooms needed to be twice their size.
- Project rooms needed to be separated from advisories.
- The small schools should be on two floors instead of one.
- The high ceiling in the commons needed to come down to 10 feet.
- Lockers were not needed.
- Walls had to be demountable to allow for the changes in the pedagogical design of the school.
- Furniture could not be pine and would not be obtained through prison industries.
- The second floor commons would have systems furniture for small group and student computer use.
- Project rooms would all be wet as well as dry.
- Different types of furniture that was both durable and comfortable would have to be found.
- The technology should be wireless.
- The new schools would not need a large security system.

The state administrator was used to dealing with delays in public projects that were usually not very innovative. His heart was in the innovation and he was instrumental in getting Peace Street built as a turnkey--a very innovative process for a Rhode Island public project. He also worked hard on putting as much as he could in the hands of the design committee and took away the work from the Rhode Island purchasing department. For the South Providence site, all furniture, computers, and equipment purchasing was put in the hands of the construction manager. State purchasing tried to stop this from happening, because they lost the type of control they normally have over state purchases but the state administrator with the support of the Department of Administration was able to wrestle it away from purchasing.

At one design meeting, the Rhode Island Department of Education believed they had the capacity to purchase all of the Met furniture and equipment. At this point, the state administrator had worked hard and succeeded on convincing state purchasing to let go. When RIDE continued to insist on doing this work, a strong state administrator said to them, "Never put something on the table you can't eat." This was the end of the conversation. The Met's furniture, furnishings, and equipment (FF&E) were done as part of construction budget.

The fact that the Met's furniture, furnishings and equipment were to be procured outside the state system is an innovation in the design process, but it was only innovative around the issue of time and not cost or vendor selection. The construction company and the architect still needed to make a profit and although the bureaucratic red tape of the state was eliminated and the state could hold the private companies accountable for delivery, the educators could not manipulate the budget to give more funds to FF&E. They could not manipulate the funds to figure out how to save money or prioritize the innovation. They were still tied to the design and construction process controlled by the architects, construction manager, and the Department of Administration.

In a 1994 study of public and private projects, Jeffrey Lackney (1994) studied the differences in designing and constructing public and private buildings. His research concluded that there are major differences in these processes. They are:

- Operating within a complex process leads to a complex project that requires more time and higher costs. In four out of five cases, public projects took 80% longer to design, 101% longer to construct, and cost 11% more.
- "Top-line factors" significantly influence Public Sector decision-making procedures resulting in a project that is more complex that requires more time and higher costs but has greater public accountability (Lackney, 1994, p.2).

In other words, bureaucratic oversight and public process affects time and costs. In conclusion, the process takes the creativity out of the design and construction process when the project is put in the hands of engineers and construction managers who only understand how to build a school/public project in a certain way in order to make a profit. The profit

margins are so slim that architects and engineers who do this type of work do it because it is steady work and they are willing to get a smaller profit in favor of getting more steady work. They can take on other private projects that allow for more creativity and have bigger budgets in order to fulfill those aspects of their professional work.

Architects and engineers will add an innovation to their design if it is transferable to other schools they build all of the time, but if the innovation is too outside of the box, they will design it out. They have no incentive to keep it in.

The data collected concurs with Lackney's (1994) findings re: public projects. For the Met design, the architects and construction manager behaved in the predictable manner, where there were few exceptions made to Lackney's conclusions regarding how the architects and construction manager would respond to innovation. What is surprising is that a state administrator saw this project and these educators as a means to change the way the state normally operates. In this instance, state operations were changed and they found a new way to design and build public buildings.

The translation of educational designs through the architectural and design process was grueling for the Met educators. Their *modus operandi* is to make things happen. This was exemplified by contrasting the programmatic design process, which was done in less than a year and put into operational mode even without a permanent space, and the building design and construction process, which built one school in five years and took eight years to complete the entire project.

The Met's programmatic design was not served well by prevailing school facility design processes, and that was why the process was changed in so many ways. The hiring of the national architect as an early consultant was one way that the traditional design process was changed and enhanced. If there were enough time allotted to the task by the state, then the national architect's design process for the feasibility study would have given the Met a very detailed innovative design. The problem was that not only time but cost, distance, and an unfriendly local environment to an out-of-state architect prohibited the Met from following that design process to its fullest. Furthermore, it should be noted that the Met educators had a large influence in developing the specific charettes with the national architect. The expertise of the Met educators in the pedagogy of involving all constituencies also made the process different, if not better. This made the charettes more interactive and allowed for the conversation to continue when the national archtitect was not around.

This collaboration between the national architect and Met educators was an example of how an integrated design process produced an initial design that was a superior product. The bond and understanding formed out of this collaboration between architect and educator is only one part of the eight processes for design and construction going from conception to completed construction. It is one of the processes that was altered from the traditional methods of designing a building.

In most cases, as it was in the case of the Met, an architect was hired (in 1993) to do the initial design of the school, the Feasibility Study of the Metropolitan Regional Career and Technical Center, Educational Program Design and Facilities Specifications for the Greater Providence Career and Technical Center without the programmatic design fleshed out. Here form is not following function and the architect's mental model (Senge, 1994) creeps into the design, stalling innovation even when it was called for in the RFP. The political forces at work to create the school as an entity forced the Chairman of the State Board of Regents to develop a design in this manner, with little thought about changing the design process to get a more innovative design. At the time, there could not be a collaborative effort because there was no one to collaborate with on the design. There were no educators on board who were going to design and direct the program of the school.

Once the design of the Feasibility Study done by the national architect and Met educators was approved by the State Board of Regents, the next two steps in the process were to find the land for the school and hire an architect to do the details of the design. There was little innovation by RIDE or the State Administration shown at this time with regard to these processes. Both were done through the normal way of doing business. Although they tried to change the processes, the Met educators were only consulted on selection; they could not change the process. The Governor's office insisted that the processes be carried out as they always had been. It should be noted that this insistence this was a source of frustration to both the state administrators as well as Met educators. At one meeting, State administrator sums it up very well when he stated, "They'll tell you why you can't do things rather than why you can. " The political forces at work created a climate that was not conducive to an innovative design process or design.

In 1997, the Met's innovative design was put through a series of processes that proved much of Lackney's (1994) points regarding how funds and time are spent on public projects. For example, it took two years (1997-1998) and three RFP's for land and to

decide that the land originally slated for the school could be used. The money and time was spent by the system to ensure that everything was done according to how the system can accept the property. It should be noted once again that as of 2002, the land has only been turned over to the State through a Quick Claim Deed. There is still the issue of the gas line to be settled before the State completely takes ownership of the land. It took two RFP's for an architect to hire the team of the national architect and local architect. There was always a leaning toward "let the system work" rather than working toward understanding the nature of an innovative project. This attitude prevailed throughout these processes. In fact, the only way that the national architect was allowed to continue the work on this project was if the lead architect was the local architect. The national architect was still in charge of drafting and presenting the design at the meetings but there was scrutiny and oversight of the design by the local architect. This process decision was made without the Met educators. The decision was made at the level of state administration. This was an example of a disintegrating design process that was more about power and control than working together.

During the architectural design process, it became apparent that this decision to make the local architect the lead architect took final design decisions out of the hands of the Met educators and the national architect. Although architects, educators, administrators, and students agree that the design has lots of integrity, they also know that certain architectural and educational components were designed out.

Student stated.

- "In the design team there was some communication problems that could have been better."
- "Of course, everything in our programs are in there."

The national architect stated:

- "It's a matter of authority not money and time. I would design a work of architecture and a work of art."
- "I would also design it as a green building."
- "We did it. It doesn't have everything that we wanted but it does meet the basic criteria for personalization. All the layers, movable walls. We have a really good product."

Over the course of many design meetings there were discussions and arguments over design features included in the project by the national architect. Two of the many areas of disagreement were over what the exterior materials to be used for the building should be, and whether to include the flexible wall panels in the small schools. Both the local architect and the state administrators and a state property administrator insisted that the curtain wall/clear story design suggested by the national architect was too modern a look for a school and for South Providence. The facilities journal (4/3/00-4/6/00) the Met educator kept revealed that the argument went as far as the local architect claiming that curtain wall or clear story could not be used because its fire rating wasn't high enough. When pushed about the fire rating as a legitimate argument, the national architect disagreed but the local architect had more credibility with the state administrators when it came to state regulations, and they collectively decided the exterior of the building was not going to be what the national architect preferred.

Another journal entry (4/6/00) reveals both state administrators stated their concerns in the following way:

- "The school does not have a New England flavor."
- "Would you see a building like this at Brown?"
- "Will the building hold up to the winter weather? Will the school holdup over the years?"

On the other hand, the national architect was very strong that "the exterior of the building make a statement that the community will be proud of that will also say something about the difference of this school and its programmatic design" (Journal 4/17/00).

The national architect and the local architect argued with one another about the design process. Since the local architect was the lead architect, he was the one who had more opportunity to speak with the state administrators. In fact, the national architect asked that there be a stop to the side conversations the local architect and the state administrators were having. In the end, the clear story and the curtain wall were taken out of the design and replaced by brick. Upon further probing at design committee meetings in the fall of 2000, it was discovered that another reason given by the local architect for not going along with the design was his concern of the project not staying on budget. The local architect stated, "the use of the glass and any other material cost more than just the brick, because two trades take lots more coordination, and therefore cost more." According to other architects interviewed, this is only true if people don't know how to work together, and the architect and construction manager don't coordinate the job correctly. Also, the national architect remained adamant that the materials he wanted to use were cheaper than the ones the local architect wanted.

This example shows how an innovative design calling for a different exterior look causes problems for architects and bureaucrats. The economic, political, and social forces at work that are trying to make this school look like any other school are strong even when it comes to the "skin" of the building.

The movable wall panels for the interior space provide tremendous flexibility for the programmatic design of a school. These walls allow a building to change as the program changes. The national architect and the Met educators were adamant these walls remain in the project even though their costs were calculated to be $250,000 more than using other materials. The local architect and the state administrators were just as adamant that these walls not be part of the project, not only because of cost but also because these types of walls had been installed at the Community College of Rhode Island 15 years ago and were never moved. The Met's response was their program never changed and that's why they were never moved. The Met educators guaranteed the walls were going to be part of the programmatic design. The walls were installed in the small schools and the cost was only $65,000 more to do so.

These movable walls represent the "no backsliding" strategy at work. They also point out the need for an integrated design process where everyone understands the programmatic design and makes decisions based on what is best for students rather than on previous school designs.

The design processes were very difficult to work through. They took time and a great deal of energy to have decisions made based on the programmatic design. Neither the Met educators nor the national architect had enough authority to move the project in a more timely and cost-effective way. They were not the ones who pay the bills, the state was, and anytime there were higher costs because of higher material costs, building costs, equipment costs, or site preparation, the costs eliminate the innovation. Therefore the more time spent on the process, the more the costs for the project run. Other examples of time factors that affected cost included the process of getting to approve the turnkey and design build approaches used in the building process; and the turning over of the land acquisition process to the Providence Redevelopment Authority. The exception to this was the national architect's design process, which was controlled by the Met educators.

It should be noted that the Met students played an integral role in the design process of the school. Met educators brought students to nearly every design committee meeting. They were there not only to have their voice heard, but also had real roles to play in the development of many of the physical spaces. The following list of projects they were involved in shows the scope of their involvement.

- Program and physical design for the School Based Health Center.
- Designed and collected data on the fitness center and rock-climbing wall.
- Participated in over 20 design charettes.
- Participated in Design Committee meetings for four years.
- Surveyed and prepared the Peace Street site with the construction company through their Learning Through Internships (LTIs).

Over the course of three years, three different groups of students did all of the grant writing and design work around the school based health center. These same students did a needs assessment mapping of the community, wrote all of the grants for consultants, ran the advisory board meetings, selected the healthcare provider, selected the furniture, and presented the data and the idea of a school based health center to the Design Committee.

Student work was also responsible for the addition of a rock-climbing wall to the Fitness Center. A Met student presented data to the Design Committee, built the prototypes for the handgrips, designed the rock wall, and selected the company.

Met students were involved in 20 design charettes for furniture and space. They helped design the television studio, audio recording studio, and kitchen. They also wrote the grants for landscaping the surrounding streets and selected the trees and shrubs for the site.

What the Met educators got out of this design and build process was a keen understanding of how to design and build more Met-like schools in a more timely and therefore cost-effective way. The integrated approach that connects architects, construction companies, administrators, community, students, educators, and politicians is key to translating innovative designs into facilities. The educators need not be in control, but need to thread the design through each of the eight processes to insure that all parties involved in design and construction are on board with the design at the level of programmatic approval.

Impediments and Facilitators

The research investigated the ways in which prevailing principles and practices of school facilities design impeded or facilitated the translation of the Met program design.

- Facilitate - Educational design charettes

- Impede –Of almost all as originally conceived, almost all impeded.
- Facilitated - by the PRA, design build, turnkey, FF&E
- Design and construction processes - Impede
- Findings for the Met

Design – Table 8 outlines which processes impeded or facilitated the translation process. The processes that facilitated the design with an asterisk next to them were created for the Met and were not used by the state prior to the Met project.

Table 8
Chart of School Facilities Design Processes

Process	Facilitated	Impeded
Educational Programmatic Design and Political Process-for programmatic approval	Yes	
Land acquisition process		
• RFP for land acquisition		Yes
• PRA	Yes	
Architectural selection process		
• Turn key	Yes	
• Regular		Yes
• National		Yes
Architectural process		
Architect #1	Yes	
Feasibility Study	Yes	
Architect #2	Yes	Yes
Construction Selection process		
• Turn key	Yes	
• Design build	Yes	
State purchasing (awarding of bids) process		Yes
Project management process		Yes

The translation process of the Met forced a new approach to many of the existing processes. Starting with the Educational Design and Political Process, the Met directors got approval for the programmatic and physical design of the Met from the State Board of Regents, the Commissioner, the State legislature, and the Governor. Once this was done the state administrators and department of education officials were bound to design a school matching the elements in the approved programmatic design. This approval put the Met directors in the lead position on a design that was so different that no one else was familiar with it to take the lead. The hard part was getting the system to make the design a reality given the processes that were in place.

Over time, the design committee found different ways of changing any of the processes procedures they were going through, so the end result created the innovative school called for in the Feasibility Study (Bingler, Littky, & Washor, 1996). For example, when the Request for Proposal process for land acquisition did not work, the state administrators agreed to work with the Providence Redevelopment Authority to access the land. The Met directors were the constituents who led the state design committee to the Providence Redevelopment Authority.

When the Met directors needed to expand the school to 220 students, and there was no more room to grow in the Shepard Building, it put pressure on the system to design and build the Peace Street School in the fastest way they could. Given the urgency to build the school in six months, the state approved a turnkey contract with the landowner, the architect, and the builder. For the first time in Rhode Island, the turnkey process was used in a state project. On the other hand, when the state was in less of a hurry to build the next phase of the Met, the architect selection process took months. The Request for Proposal was re-issued, and the final selection awarded to two architects, one national who knew the design and one local who knew the workings of the state system and the state codes. The local architect was made lead architect by the state's selection committee without the Met educators involved in the decision.

The architectural process impeded the translation of the design when it stuck to the traditional approach of sequencing the architectural and engineering design process. The design committee tried to make decisions based on cost and familiarity with materials, not on the innovation. It made excellent progress during the re-design, because the process was handed over to the Met and the national architect.

The construction company selection process was run by the state and although the process was slow, the land acquisition process was going on simultaneously. Therefore, the slow process for selecting a construction company did not interfere with the timeline of the project.

The final construction process was a design build. This process was the state administrative team's way of getting this type of project done. If the Met project were to run through the state system in the traditional way, there would be too many questions asked about the Met design and way of doing things. The design build process gave more autonomy to the construction company, but with proper monitoring it was the belief of the state administrators that time, money, and translation to an innovative design would be the outcome.

It was on rare occasion that the prevailing school facilities design processes facilitated the innovative design of the Met. Whenever the traditional processes were used, regulation, the status quo, and the political, economic, and social forces affected time and cost which drove innovation to the periphery of the design committee's attention. What was significant was that the state administrators were willing to take on new ways of designing and building an innovative facility while at the same time conforming to the rules and regulations of the system. In the end, the processes were choppy, not smooth, but the design committee became familiar with the design of the Met, its language and the program in significant enough ways to translate an innovative design into a facility.

V. SUMMARY, DISCUSSION, AND RECOMMENDATIONS

This research examined the translation of the Met's innovative pedagogical designs into a facility. Two research questions were addressed:

1. What are the forces at work in translating an innovative pedagogical and organizational school design into a facilities design?
2. How do prevailing concepts and processes of school facility design accommodate the translation of innovative pedagogical and organizational school designs?

A case study using qualitative research methodologies was employed because it allowed for in-depth and detailed study of the dynamic and detailed complexity of the interactions among the many individuals, events, and decisions involved in the Met design. These methodologies included in-depth interviews with all key individuals, as well as experts and expert practitioners in education, architecture, facilities construction, document analysis, and participant observation, plus a review and analysis of relevant research and literature in addition to visits to selected schools. By using three different forms of data collection (interviews, observational field notes, and program document analysis), the researcher triangulated emerging findings, thereby enhancing the validity of the data.

This chapter provides a summary and discussion of findings, and presents recommendations for dealing constructively with the identified forces at work and the "two cultures" of education and architecture in designing and building new school facilities for innovative schools. The summary and discussion include references to previous literature.

Summary of Literature

The review and analysis of the literature addressed five areas that contributed substantially to the research design and to data analysis. A summary of this review revealed these significant points.

School Facilities Design

- Facilities designs have been shown to have an impact on student learning and related student development, as well as on others who work in schools.
- There have been few innovations in school facilities design.

Learning Environments

- There are many researchers, architects, and educational planners who have developed design process plans and theories about what schools should be in practice and what their facilities should have in their physical layout, but they have few schools to show for all their thoughts and writings.
- The learning environment research abounds with articles on climatic conditions such as adequate lighting and air quality. These facilities planners and architects speak and operate with specialty languages and building codes for school design that do not address translating pedagogical designs into facilities. On the contrary, many of these regulations prove to be a barrier to change.
- At the turn of the century, there were educators like Dewey, Wirt, and Montessori who were keenly interested in the school's learning environment and designed schools based on their innovative philosophies and practices. Some of these translations have withstood the test of time in their own niche of private schools, but they have not affected the present public education system on any scalable level.
- Most public school systems accept the established mental model of a school and use economies of scale as a justification for building facilities the way they are being built. "The districts refuse to construct anything innovative and through these old school designs betray our children and deprive them of places they truly can enjoy" (Childress, 2001, p. 214).

Interest and Motivation

- Schools need to adapt and be flexible so students can pursue their interests.
- Schools are not programmatically organized to educate students by allowing them to pursue their interests.
- Children are learning much more outside of school with schools getting credit for this learning, including reading.
- A new set of design principles, both programmatic and physical, are needed to promote the development of interest-based learning and the education of children. How to translate design principles based on interest and motivation into a school facility is still a perplexing issue.

Career and Technical Education

- Most of the recent research on the translation of complex pedagogical designs into innovative facilities is coming out of the career and technical arena. Included in this movement are researchers such as Copa (1992) calling for all high schools to transform themselves into career academies and learning communities. Thus far, there are few examples of schools that have transformed and sustained themselves.

Small Schools

- The research on small schools and facilities design is scant. There is even evidence that small-school researchers are not very concerned with facilities because funds for facilities compete with funds for small school programs. Funds for creating small school programs, not their facilities, are what really interest small school advocates.
- The argument for economies of scale is still a barrier to building small schools. It is only recently that architects and educators are trying to develop an argument for the economies of scale of small schools (Bingler, unpublished; Lawrence, 2002). Furthermore, there is a disconnection between the language small school reformers use and the language that architects, and bureaucrats use.

By combining the summaries from each area of study with the chart, the following major issues emanate from the research and literature:

- Different "languages" are used by the different professionals.
- Competition for similar funds causes a lack of collegiality.
- There is a lack of familiarity with the processes of each area of study to design schools.
- There is a lack of sustainable designs and/or designs that can be replicated.
- Strong bureaucracies are in place regulating the process and selection of school designs.
- The major economic force for building schools is still economies of scale for large schools.
- Professionals and researchers in the five areas rarely read or communicate with one another. Each has his or her own way of approaching a problem.

Despite these issues, the review of the research reveals a small but growing trend toward the development of designs for small schools. The school facilities designers, learning environment researchers, psychologists studying interest and motivation, career and technical educators, and small schools advocates are all moving programmatically toward small schools. The research shows that there is interest in translating the programs from these different fields into facilities, but very few facilities have been built that carry out the program design into facilities.

Finally, it is interesting to note that the Met is the only school studied that connects its programmatic and physical designs to all of the five areas in the literature review.

Summary of Principal Findings

Forces at Work

This research identified three major forces at work in the process of translating the highly innovative pedagogical and organizational school design into a facilities design. These were: 1) political, 2) social, and 3) economic. Several major sub-themes were identified in each of the areas, and are identified in Table 3.

Several factors were identified as facilitating or impeding the translation process. These factors are listed in Table 9.

Table 9

Facilitators and Impediments to Translation

Facilitators	Impediments
The development of strong relationships between all constituencies in the design process.	The strong attraction to the traditional mental model of schools by many of the constituents.
The strong leadership of Met educators who knew the difference between compromising and caving in.	The traditional design process that puts architects, bureaucrats, and construction companies in charge of the specific aspects of the school design project without sufficient voice from educators.
The lead role of the Met educators in the development of the programmatic and physical design of the Met's new mental model.	State regulations.
The strong voice of Met educators, not their position in the system or in the design process affected decisions.	A traditional design process set up for rigidity and durability.
A "No backsliding" strategy on the part of the Met educators and the national architect.	The economies of scale for large schools.
The strong insistence on using new language to define the Met school's program and space design.	The parts of the project that were designed without educator voice or approval.
Designing for flexibility in the Met school's programmatic and physical design.	The long length of time the project took to complete.
The educators "lived" the innovation, and built the innovation at the same time.	The new people coming on the project in the middle of the project needing to be caught up on the design before the project could move forward.
The student and community voice in the design process.	The lack of understanding of the programmatic design on the part of politicians, state regulators such as fire inspectors, and building and educational code inspectors.
The approval of the programmatic design by the State Board of Regents.	
The buy-in by the Design Committee of the programmatic design.	
The strong leadership, support, and high visibility of the Met's Board of Trustees, especially the president of the Met Board, and their trust of Met educators.	
The strong support from and access to the Commissioner of Education.	
The architectural and construction process becoming more innovative because of the innovative programmatic and physical design.	

The dynamics of the relationships between the numerous constituencies involved in the process for designing and constructing schools was found to be a major factor in understanding the forces at work. The research identified several sub-factors:

- Language issues between the educators and all of the other constituencies.
- Understanding of the Met's programmatic design.
- Power dynamics that involved authority and control over the economic, political and social forces at work on the project by the Rhode Island Department of Education, the Department of Administration, the State Budget Office, the State Purchasing Office, State lawyers, the Providence Redevelopment Authority. The Alexander Hage Syndrome: Who's in charge? I'm in charge.
- The local architect was the final authority over the national architect regarding decisions on the architectural and engineering drawings.
- The capacity of the Design Committee to understand how to design and construct a school
- The power of the community on the selection of who is awarded contracts, and the workforce representation on the job.

These dynamics appear to have affected the translation process in these ways:

- Additional time to complete the project.
- Additional cost to complete the project.
- Funds not going toward the educational facilities but toward architectural, engineering, construction, and administrative costs.
- The development of innovative ways to construct the school using turnkey and design build processes.
- The development of innovative ways to issue Requests for Proposals to award contracts to minority businesses
- The development of working relationships between the state of Rhode Island and the city of Providence.

Alignment and Accommodation

In attempting to identify the nature and scope of possible alignment and accommodation between the programmatic design and the facilities design processes, the research identified three areas of tension: 1) purposes, 2) innovation vs. regulation, and 3) standard operating procedures (SOPs) vs. adaptation.

Purposes. The program design process has as its principal goal the advancement of student learning, while the facilities design process has as its principal goals efficiency, durability, and cost.

Innovation vs. Regulation. The Met program design challenges many features of traditional schools and schooling. Existing regulations regarding school design are based on traditional schools.

Standard Operating Procedures vs. Adaptation.

These aspects of the Met program pedagogical design were viewed as essential by the several constituencies.

- Small schools of no more than 110 students.
- A personalized school reflecting a philosophy of educating one student at a time.
- Interactions with adults in the community in relation to student interest.
- The practice of enhancing learning in the real world, through the practice of Learning Through Internships to develop academic skills and personal qualities.
- The Met as a community school to include:
    - A school based health clinic
    - A fitness center
    - A television studio
    - A kitchen
    - A community field
    - A performance center
    - Meeting rooms
    - Advisories
    - Project rooms
    - A Small School Commons
    - A physical design that adapts to programmatic changes
    - Families are enrolled at the Met, not just students

The data indicate that prevailing school facilities design processes do not accommodate any of the essential Met program design components. These components include:

- The educational programmatic design process.
- The architectural selection process.
- The land acquisition process.
- The architectural and engineering process.
- The construction selection process.
- The construction process.
- The awarding of bids process.
- The Project management process.

Table 10 identifies the areas of alignment and non-alignment.

Table 10
Alignment and Non-Alignment

Alignment	Non-Alignment
The equipment and square footage for a kitchen, television studio, school-based health center, performance center, and basketball court.	The prevailing idea of economies of scale for schools.
	The mental model of school.
	The language used to define school programs and space, such as classrooms, auditoriums, gymnasiums, lockers, and hallways.
	The inventory and use of educational space for the American high school.
	Space for students and staff.
	The construction and organization of large schools defined by departmentalization.
	The state guidelines set up to define high school space, use, and square footage.
	The security for a high school.
	The furniture, fixtures, and equipment for schools.
	The regulation size fields for soccer and football.
	The use of a climbing wall in the fitness center.
	The recommended square footage for either a large or small size high school.
	The use of a school based health center.
	The use of a performance center for a school and a community.

Table 11 identifies the areas in which prevailing school facilities design processes facilitate or impede the translation process.

Table 11
Facilitators and Impediments

Facilitators	Impediments
The bureaucrats will work to get a programmatic design built once they are given approval that the innovative design is what is to be built.	The step-by-step approval in all of the design and building processes are vague and not clear.
	There was no one on the Design Committee directing any of the design and construction processes with the authority to make high-level decisions that were political, economic, or social in nature.
	The regulations and codes for designing and building schools.
	The time it takes to get confirmations from the various state offices that need to approve budgets, awards, and purchases in order for the project to move forward.
	The oversight of the state on the project.
	The mental model of schools held by members of the Design committee.
	The payment process for services.

It is the combination of these forces at work and tensions with respect to prevailing principles and practices that describe the way in which highly innovative pedagogical designs are translated into school facility designs.

DISCUSSION

A small number of constructs based on themes and patterns appear to have operated across the social, political, and economic forces. These constructs have implications for understanding the overall dynamic involved in translating complex pedagogies into facilities design for future Met schools and other small schools. Examples of these constructs are mental models, language and ideas, the design process, no backsliding (i.e., persistence), and economies of scale

The social, economic, and political factors and forces at work halting facilities design innovations are clearly entrenched in the respective fields of education, architecture, construction, government, and politics. They are manifested in the policy for economies of scale, the over-regulation of building facilities, and the heavy reliance on the traditional mental model of a school.

The Mental Model

The mental model of what a school is and how a bureaucracy works was strong in all constituencies except the Met educators. Research by Senge (1994) revealed that these mental models are powerful and yet invisible to people. They shape our behavior and attitudes and constrain our thinking and our ability to act differently. Overcoming stakeholders' mental models of school in order to design and build the Met, and to change the educational, architectural, and construction processes constituted the most significant hurdles of translating pedagogical designs into facilities.

Childress (2000) points out that the inventory of spaces in American high schools has been the same for generations. These spaces include classrooms, hallways, lockers, gym, auditorium, cafeteria, band room, janitor's room, labs for science, fields, parking,

and nowadays a computer lab. Once we know how many students we have, then numbers are applied to the Agricultural Graphic Standards and state guidelines. Childress goes on to state, "The list of spaces and its associated geometric and financial arithmetic is what the design is based upon, what the school district expects, and the architects provide. It can be done in its most basic form in half a day" (p. 214).

Childress' research exemplifies that living with and accepting a certain mental model and beliefs for what a school is, makes the ensuing experience almost inevitable. We therefore shortchange our kids, by refusing to construct anything innovative; and through our landscapes betray our children and deprive them of places they truly can enjoy.

In comparing The List of Design Innovations to Childress' list, it is apparent that none of the names Met educators give to school spaces are the same as Childress' assignments. The Met is a school built on relationships and real world learning, not traditional departments. There are no hallways in the Met's design and no cafeterias. Space is designed to be changeable, flexible, multi-purposed, and open to the surrounding community.

When the Met directors received initial approval of the programmatic and physical design from the State Board of Regents and the Commissioner of Education, the Met co-directors were on their way to changing the mental model of a high school. They were then ready to translate their design into an innovative facility.

Once the mental model of the school changed in the different constituencies, the language and ideas for this innovative design needed to reflect the new model for the Met school.

Language and Ideas

"The great difficulty in education is to get experience out of ideas." George Santayana

Santayana's quote is part of the language issue involving innovative school design. The Met's innovation is manifested not only in architectural ideas interpreted and explained through language, but by taking those ideas and putting them into practice, as well as, by creating the physical architecture, the school facility. The struggle to get people to use the same language to mean the same thing in describing the Met facility was a difficult task, but as related in other cases of innovative design described in Chapter 4, it is usually difficult in other school facility projects as well. The literature review on Small Schools establishes that the task is difficult enough for educators to use the same language when talking to one another about innovative design, but when architects, bureaucrats, construction managers, educators, community people, lawyers, and politicians started to talk about the building of the Met, many complications around language to describe new ideas and new physical space arose.

The field notes, meeting minutes, and the series of interviews that were conducted give further evidence to the complex nature of language in understanding pedagogical designs. The national architect and the local architects argued over language. State administrators argued over language. The builders argued about language. The clarity of using the same terms to describe ideas was many times cause for major disruptions and time delays.

Language was a key impediment to the translation process. Many similar terms were used to mean different things to different groups. For example, the Met educators and the national architect wanted to have the flexibility to change the shape of the interior space with demountable walls. This would ensure that the school could change its space when the program changed. This type of flexibility was one of the learning signatures listed in the feasibility study (Bingler, Littky & Washor, 1996). The rest of the design committee felt demountable walls would never be used because they could not think of one instance where demountable walls were moved in a building project where they were installed. On closer examination, it became apparent that the walls in these other projects were not put in by educators, but by the architects and policymakers, and therefore were never part of the educational programmatic design. This could be the reason they were never used. In other instances reflected in the meeting minutes, rooms stopped being referred to as classrooms and labs, and were called advisories, project rooms, meeting rooms and commons. The auditorium became the performance center. The gym became the fitness center. A school-based health center was added to the nurses' office area. Although the terms were used, it was difficult for most of the design committee to understand the interior needs for these spaces, but once the language became common to everyone the design of the spaces, the furniture and equipment needs were left to the educators.

As much as language was a key impediment to the translation process, once the new language about space was agreed upon by all constituents, the language became an asset in moving the project forward and not a barrier. The new language made the design committee a more cohesive group.

The adoption of a new language only became an asset to the translation process when the Met educators also learned the different terminology of architecture, bureaucracy, construction, land acquisition, as well as educational design for space and furniture. Without an understanding of the language from these fields, the different constituencies could include design elements that were not specific to the Met's programmatic design and in fact took away funds in the process. For example, the understanding of the types of windows, lights, and HVAC units the engineers and construction managers were putting into the building could interfere with learning through their noise level, as well ascost more, because there is more of a margin of profit to install one type rather than another. These examples argue for the case that educators become "bilingual." In this way they have the ability to understand what is happening in a building project and can influence and make decisions about items that may appear not to affect the learning environment of the school, but in reality and sometimes indirectly have huge implications on the success of translating pedagogical designs into facilities.

Political

Once a new language for the Met was established, along with an understanding by the Met educators of the terms in the language used by architects, bureaucrats, builders, state administrators, politicians, and community groups, the traditional design processes changed to allow innovation in the programmatic, architectural and construction processes. The eight processes outlined to design and build a school operated in a political manner -- in the sense that the lead members of each committee reverted to political solutions to resolve issues and move the process along. The Met educators' leadership in developing a "no backsliding" strategy was a political response to changing these processes in order to facilitate the translation of the innovative design into a facility.

No Backsliding

Met educators developed a strategy of "no backsliding" and a commitment to stay over the long haul. The research does not show any mention of a "No Backsliding" strategy. This strategy was originally developed by the Met co-directors to counteract any attempts by their own staff to succumb to going back to a traditional program or physical model. What the "no backsliding" strategy does is fight and challenge the mental models of schools and design processes constituents are using. Senge (1994) points out, "There is no citing of the discipline of how to manage mental models" through Senge's "surfacing, testing, and improving our internal pictures of how the world works "(p. 175)."

On the contrary, throughout the review, there are systems and bureaucracies in place continuing the existing way things are always done which prevent new school designs to be translated into new facilities. It is these constituencies that are addressed and educated through the "no backsliding" strategy. The results of the data show that this strategy was one of the methods that facilitated the translation of pedagogical designs into facilities. The Met educators held to their new model of a school and used the approval they received from the State Board of Regents and their professional and community organizations to put pressure on the system. It remains a question whether this strategy can be generalized to other projects and schools.

One way the "no backsliding" strategy is being tested is through the "growth" of the Met's design, a Gates Foundation funded project to put twelve Met-like schools in twelve cities around the United States. So far, the preliminary data on the building of these schools in Detroit, Michigan, Oakland, California, El Dorado, California, Federal Way, and Washington has shown that the schools are being translated into designs with the same physical design of the Met at a lower cost and a faster rate of completion (see Table 5).

The data begs the question of whether, once the model is a physical manifestation, is it easier for the varying constituencies--including educators, architects, policymakers, superintendents, school board members, bureaucrats, builders, and community--to change their notion of the established mental model of a school and build a new facility based on an innovative design.

The "No backsliding" strategy had a direct impact on the entire design process of the Met. This strategy became a political tool of Met educators because of the political nature of the way decisions were made in the design process.

Design Process

Met educators led the educational programmatic and physical design of the Met's design for a high school. Senge's work (1994, 2000) does not detail how to change mental models of constituents who design and work in high schools. He only offers that mental models are a deterrent to change. Educator/facility designer George Copa (1992) put forward a design for the New Vision for the

Comprehensive High School that included the following design features (p. 16):

- Guaranteeing a set of learner outcomes linked closely to future life roles and responsibilities for all students
- Learning expectations, which include both knowing and applying learning in life situations, using authentic assessment
- Multiple ways to learn that are responsive to learning styles and interests
- Integration of high-level academic education and modern vocational education for all students
- Partnerships with parents and families, business, industry and labor, community-based organizations, and other schools to diversify learning settings and improve learning effectiveness
- Special character or focus to the school that gives coherence and spirit to learning
- Operation as a learning community that pays attention to caring, attachments, and expectations often requiring the subdivision of large schools into smaller units.
- Alignment and unification of the components of the school in the interests of quality and efficiency.
- Decision making that is consistent with general goals, yet can help solve immediate problems.
- Partnership with the larger community as a way to make learning up-to-date and meaningful.

Copa goes on to develop the use of a design process he calls the Design Down Process. This process requires schools to develop learning signatures, learner outcomes, learning organizations, decision-making, learning partnerships with parents, families, community-based organizations, business and industry, other schools, staff and staff development, and learning technology. Copa leaves it up to the school staff and students to use his process to develop specific programs and learning partnerships. All of these processes are intended to create new learning environment designs based on innovative pedagogies. These spaces include open areas, small cubicles designed for five to ten participants, larger gathering places, and a number of individual and independent learning places. The School for Environmental Studies is an example of a school that used his process. (Copa, 1999).

Similar to Copa's design, the Met's programmatic design and feasibility study (Bingler, Littky, & Washor, 1996) lists learning signatures, learner outcomes, learning partnerships with the community for apprenticeships for service occupations, and learning partnerships with businesses for the Learning through Internship component of the Met. The result was the creation of learning environments in Met schools that are very similar to what Copa described above.

A key element of the Met translation of innovative pedagogical designs into facilities was that the Met co-directors led the programmatic and physical design of the new school. Lackney (1990) points out that the reason why the open classroom facilities-design concept failed to be implemented by educators was that it wasn't the educators who led or developed the physical design. It was architects and educational policymakers. Alexander (1997) also discusses the fact that the open classroom concept created pods with windows, but construction companies and architects designed the same schools with fewer windows to save on costs. When school designs with open classrooms were built, the physical design did not match the programmatic design and the system ended up with lots of unusable and noisy space.

At the School for Environmental Studies, a school that used Copa's process, and a number of other schools like Eagle Rock and High Tech High School; the educators led the design process. Each school also had nationally known architects support the architectural design. Two of these schools, the School for Environmental Studies and High Tech High are charter schools. The Eagle Rock School is a private school. To date none have been successfully replicated. (Note: High Tech High is one of the Gates' awardees with schools going on-line 2002 and 2003).

The charter and private school status of these schools gave them more freedom in making decisions about their program and design. Lackney (1994) points out in his study of public versus private buildings that public projects have a more complex process that leads to a more complex project requiring more time and higher costs. There is not much incentive for an architect or a builder to pursue an innovation, because of the constraints of time and cost. In light of Lackney's findings, it is very possible that these schools are treated differently than other schools, because of their non-traditional status as charter and private independent schools. This gives license to architects and builders for more innovative designs. It is also significant that in the case of all of these schools it took 2-3 years to build them as opposed to the average public school, which takes seven years to design and build.

According to Lackney's study, public projects cost more and take more time because of their requirement for greater accountability to the public. If they were less perceived as a public project and had

different management and accountability, like charters and private schools, then cost and time would go down because there would be less bureaucracy to pay for oversight.

The Met co-directors led the programmatic and physical design in ways similar to these other projects. Although the Met is not a charter, its programmatic approval by the State Board of Regents established the school as a Local Educational Authority (LEA) with its own Board of Trustees. The differentiating factor for the Met was that the Met's facilities budget was passed by the voters of Rhode Island as a state bond, and therefore subject to the political and state bureaucratic accountability systems. This is where the Met's co-directors strategy of “No Backsliding” was tested.

As the design process evolved, it appears that the programmatic innovations championed by the Met stimulated architectural and construction process innovations. In 1996, when the Met design was approved as a group of small schools with a radically different programmatic and physical design, it was not easy to get the Design Committee to give up the processes they were familiar with and were bound to adhere to. The first concession came when the national architect was hired through the state awarding process. This nationally known architect gave the project the creative drive it needed to translate the programmatic design into an innovative facility. The contract that the Department of Administration awarded partnered the national architect with a local architect. This local architect was appointed as the lead architect at the Department of Administration's request. And although this decision caused many problems, it helped legitimize the project in Rhode Island and gave the design credibility with state administrators.

The second concession came in the form of following different processes for land acquisition and construction. Initially, members of the Department of Administration, the Department of Education, and State Properties tried to consolidate the design as a large school at the Armory. They also thought of terminating the project, because they could not find a suitable site for building. The Design Committee finally resolved the land acquisition issue by following the Met educators’ suggestion of contracting with the Providence Redevelopment Authority to access the land.

The longer the project went, the more the Design Committee members saw the opportunities to change parts of their own design and build process. The Design Committee did this by adopting the first ever turnkey approach to building and later a design-build approach. Once the Design Committee bought into the innovative design of the Met, they started to innovate ways of getting the Met built and in many ways changed or altered their own processes. Although - the Met educators welcomed these changes in approach, they knew nothing about using the innovative techniques of turnkey and design build to complete the project. It was the members of the Design Committee who understood that the Met project could help them understand how to build other projects in the state. This was the turn of events that made them become more conciliatory toward the Met project.

The Met educators were able to play a strong leadership role because they simultaneously lived in the innovation and built the innovation. In the political arena of Rhode Island, the Commissioner insisted that even though the Governor's Director of Administration was an excellent advocate of the Met, the legislature was not. The Commissioner felt that what countered these differences were the instincts of the co-directors to "not wait till you have the building. The instinct to open now was the most critical fundamental decision." “Without the push to open without a building, the Met would be a memorial of concrete to someone. This is what this would have been." The fundamental issue for an experienced commissioner was not to have the issues with the release of bond funds drive the design and be the motivation to build a school, but for the design to be the motivation for the building and also affect how the bond funds were spent.

The innovation of the facility hinged on the leadership of the Met educators to start and do the program, rather than focus on bond money to get the building built. Without a program in existence, there would be no innovative physical design. In the immortal words of Mother Theresa, “"What you spend years building, someone could destroy overnight. Build anyway."

No references turned up in the literature review that documented a design developed by educators "living in the innovation" and then building the facilitiesafterwards, but this strategy may prove to be helpful to those who are designing innovative programs and then building facilities. If the Commissioner is correct about the Met co-director’s strategies, then charter schools and the rebuilding of designs like the Met should take into consideration the "living in the innovation" strategy as a way of translating a design into a facility.

Economics

The architects and construction company managers wanted to follow the economies of scale established procedures. Met educators argued that there were “penalties of scale” (Kolinsky, 1995) in this process. As Lackney (1994), points out, most

educators, architects, and builders of schools use an economies of scale argument to constrain the design to the mental model of schools they know how to build. Most of the schools being built today are designed and built based on the economies of scale argument. The local architect, bureaucrats, and the construction company for the Met project were no different, and they too subscribed to economies of scale. Their processes were set up to build the traditional types of schools in the most productive ways according to their procedures. Research by The Public Education Fund (Klonsky, 1995) indicates that the premise that small schools are more expensive to operate has always been false.

> Rather than economies of scale, the researchers found penalties of scale. Difficult to manage efficiently and safely, large schools require a disproportionate increase in management; an extra 'layer' of managers - subject supervisors, assistant principals, deans, additional secretaries - separate principals and teachers. (p.1)

Furthermore, this research identified ways that the costs of acquiring land, designing, and constructing small schools can be cost effective. These recommendations include greater flexibility in site acquisition, renovation of existing abandoned and underutilized buildings, and collaboration with other public agencies to incorporate small schools into multiuse facilities. Herb Walberg (1994) found a parallel between growth in school size (400 percent since 1940) and per-student spending (500 percent since 1940). He concluded that "education in the United States clearly shows what economists refer to as 'diseconomies of scale,' where increasing size results in an increase in per unit costs" (p.4).

Historically, it is interesting to note that the economies of scale argument has its roots in the seminal works of Conant (1967) that supported large high schools and Barker and Gump (1964) that advocated for smaller high schools. Most public school policy makers followed Conant's viewpoint even when research demonstrated that, all things being equal, students learn more in smaller schools (Fowler, 1992). It is also interesting to note that Conant's notion of a large high school was a school of around 500 students, much smaller than the 1000, 2000, and 3000+ student high schools being built today(with arguments often citing Conant's research on the comprehensive large high school).

The Met School and its accompanying growth project provide further evidence to support the concept of finding economies of scale for small schools. Once the physical design of a school is changed, as Lackney's (1994) research points out, it is easier and quicker to re-design and replicate. The Met replication is demonstrating that in replication costs go down, and time to design and construct decrease. From these data, two strategies begin to emerge:

1. Innovative schools should design with the intent to re-design.
2. There is not only a penalty of scale for building large schools, but also an economy of scale to build small schools.

The Met was started in 1994 when a bond was passed to build a new career and technical school. The bonds funds were not expended until 2002, eight years later. Lackney (1994) in his study of public and private building projects points out that public projects require more time and higher costs than private projects because of greater oversight and accountability. In other words, bureaucratic oversight and public process (politics) affect time and costs. Furthermore, Lackney (1994) points out that it is the private projects that are designed in more creative ways, because they can spend a higher portion of their funds on design. They are not putting money into bureaucratic oversight. Finally, there is also the issue of public buildings being built for economies of scale and replication. This favors the point of view to design in replication of the traditional mental model, and design out anything that will not be reused.

Lackney's research, combined with the realities of the Met and other public projects in the case studies, leads to a strategy of prorating the bond funds so the project does not have a shortfall and then lose funds because of the time it takes a public project to be built. If bonds are not prorated then, just as the Met's prorating exemplified, the project needed to cut the difference between the original amount and the prorated amount out of the design. This came to $13 million. In the Met's case, the Design committee was savvy enough to design the innovation back in, but in reality, the innovative design was compromised because of the nature of how bonds are issued and how long it takes to design and construct schools.

In the 1960's, James Conant successfully argued for the comprehensive high school model that we have today. Barker and Gump (1964) had arguments that made more pedagogical sense in their appeal for smaller schools, but the politics of those times gave rise to Conant's vision of comprehensive high schools. As reported, Conant's own vision for large high schools of up to 500 students was co-opted

by an economies of scale argument for comprehensive high schools that created high schools three, four and five times larger than Conant ever anticipated.

In order to accomplish the translation of pedagogical designs of small innovative schools, the mental model of schools must change. This means that a vision and plan need to be created for economies of scale for small schools. This vision and plan needs a series of steps and strategies for translators to employ in order to break the mental model of the comprehensive high school and make it possible economically, politically and socially to counter the forces at work that keep the status quo operating in the old mental model.

The research on the Met School, the other school designs studied, and the theories researched for designing schools lead to the following recommendations to create a climate for the economies of scale of small schools. By utilizing the recommendations, translators will be able to design and build their innovation as well as focus their efforts on the bigger prize of creating an environment for building many different successful innovative small schools designs.

Recommendations

The first set of recommendations are presented as a set of strategies for addressing the three forces—political, social, and economic—and the three tensions that were identified between the programmatic designers and the architectural designers. The strategies constitute an approach to strengthening the translation process so that highly innovative program designs can realize their potential through highly innovative architectural designs.

No Backsliding. Educators must stick to their vision of the design and not fall back on the traditional mental model. They must lead the process. They must learn the difference between compromising and caving in.

Be persistent. Educators must commit to staying on and leading the project from "conception to birth" through all of the design processes. They need to stay involved and take the lead to resolve the political, economic, and social issues that inevitably come up in the translation process.

Line-up angels. Educators will need business, community and political allies to support the translation process. There are times when the educators do not have the clout or authority to lead or make decisions.

Plan and do simultaneously. Educators must plan but also "live in the innovation" as they are waiting for the school to be built. Don't wait for the building to start the program, but rather start the program without the building.

Design for redesign. Educators must establish a new mental model and build with the intent of re-building that mental model. This changes the mindset of architects and builders to lower costs and save time.

Design to change the system. The more innovative the design from the traditional mental model, the greater the risk of the design to succeed. As exemplified by the Napster phenomenon, the more innovative the design, the greater the opportunity for the design to change the system, rather than for the system to change the design.

Obtain political approval. Educators must get political approval of the programmatic design. Innovation affects change in the system once the system approves the programmatic design. Then the rest of the system is pushed to build what has been approved.

Design for flexibility, not durability. Both the programmatic and physical designs should be designed to be able to change with the times. This includes flexible building materials as well.

Develop a common language. Develop and use a common language with new terms describing the physical design, developed from the innovative programmatic design, that all constituencies use.

Question tradition. The standard operating procedures and the regulations of a system are not as standard or as regulatory as the bureaucrats think. Develop the habit of asking, "Who says so?" when being challenged on the innovation.

Spend time differently. Traditional design and building processes are set up to spend more time and more money on oversight. The strategy is to spend less time to get more innovation by spending more time on the creative design process and less on oversight. Also, prorate bond funds at the beginning of the project to avoid a re-design during budget evaluation. Assume that there will be an increase of 5 percent of costs for each year of the project.

Select an insightful architect. Educators need to get the architect they select. The architect needs to

understand the programmatic design and treat the project in the best ways he or she would treat both a public and a private project.

Integrated Design Process

The experience of the Met design process supports a major recommendation for an integrated design process. There are tremendous disconnections in the process to translate innovative designs into facilities. The educators don't speak a common language. They do not understand the design and construction processes, nor do they understand how bureaucracies work to move a project forward. The gulfs and rifts that are set up in the economies of scale model to build schools separate the whole design into its component parts that prohibit communication and collaboration. A new integrated design process to manage design and construction needs to be developed to translate innovative educational designs into facilities. This new integrated design process may not need to change all of what exists, but this process should include educators in decisions at every step of the process. An Integrated Design Process among and between educators and architects, construction companies, community members and bureaucrats needs the following up-front commitments:

- Educators need to develop a similar language to describe innovations across the variety of educational reforms.
- A new language and terminology needs to be developed for educators, architects, and construction companies that change the definitions of school space to insure the old mental model of a school does not impact negatively on the innovative design.
- Ensure that there is community and student voice in the programmatic and physical design process.

An Integrated Design Process should have these components:

- Educators need to plan and think more about innovative educational design before building. They need to use or develop design processes like Bingler's (1996) and Copa's (1992) that ensure the voices of the entire community, including students, parents and community members are heard in planning the educational design of the new school.
- Educators need to become bilingual. They need to understand architecture, engineering, and bureaucratic languages. Also, architects need to become bilingual.
- Public projects need to look more like private projects in terms of creativity and design regarding time, cost, and innovation.
- Educators should have a strong voice in the process but stay free of the system.
- Pro-rate bonds for the project to ensure there are ample funds to complete the school.
- Local administrative authority needs to understand the design and then allow for flexibility so the project does not get stopped through over-regulation.
- Educators need the political support of members of the community, including the business community, to make politicians and administrators listen to new innovative school designs and then allow the system to bend and flex.
- Educators' voices in the process need to lead with their understanding of the programmatic design.

The following tools should be developed by a national team to support the translation of innovative school designs into facilities. These tools should be published both in print and on the web.

Flow charts showing the operation and integration of the design phases that include the following processes:

- educational programmatic design
- architectural selection
- land acquisition
- architecture and engineering
- construction selection
- construction
- awarding of bids, and
- project management.

Realistic timelines need to be established to give educators an understanding of how long each process should take. Boilerplate language for contracts and agreements need to be made available to districts that want to design innovative schools. Proper communication guidelines and protocols need to be established between the constituencies so they have protocols.

Actions Resulting from the Research

Several action initiatives using the results of this research are planned or underway.

- A documentary on the Met facilities design, called *Building Knowledge*, is being produced. It documents the entire Met facilities project for the past seven years.
- A policy paper, *Dollars and Sense*, was published in fall 2000. The researcher is one of the authors.

This policy paper recommends and describes the integrated design process.

- The researcher has made keynote presentations at two architectural conferences this past year.
- The researcher is in conversations with the Aspen Institute on the development of federal policy about facilities.
- The researcher is facilitating the replication of the
- Met facilities design in Detroit.
- The researcher is creating tools from this project and publishing them on the web.

* * * *

References

Adams, A., (1995) Education for the head, heart* and hands: Shops in a college prep school. Pathways: The Progressive Education Journal. Retrieved May 20, 2002 from http://www.lwhs.org/~aadams/12.html

Alexander, C., Ishikawa, S., & Silverstein, M. (1977). *A pattern language: towns, buildings, construction.* New York: Oxford University Press.

Alexander, C. (1979). *A timeless way of building.* New York: Oxford University Press.

Applebome, P. (1995, December 26). "Record cost cited to rebuild nation's schools." *The New York Times, pp. 1 & 7.*

Arnold, K. (1995). Lives of promise: What becomes of high school valedictorians. San Francisco: Jossey-Bass.

Barker, R., & Gump, P. (1964). Big school, small school: High school size and student behavior. Palo Alto, CA: Stanford University Press.

Beem, E. (2001, April 16). The Waldorf way. *The Boston Globe Magazine.* Retrieved from http://www.boston.com/news/globe/magazine/2001/0416/Waldorf

Bingler, S. (n. d.) *Smaller schools: Are they reasonable?* Unpublished manuscript.

Bingler, S. (1999). *What if.* San Francisco: Metropolitan Project, Los Angeles, CA.

Bloom, B., (Ed). (1985). Developing talent in young people. New York: Ballantine Books.

Boyer, E., & Mitgang, L. (1996). *Building community: A new future for architectural education and practice*. New York: Carnegie Foundation.

Caine, (1994). *Making connections.* Menlo Park: Addison-Wesley.

Childress, H. (2000). *Landscapes of betrayal, landscapes of joy*. New York: State University of New York Press.

Conant, J. B. (1959). *The American high school today: A first report to interested citizens*. (1st Ed.). New York: McGraw-Hill.

Conant, J. B. (1967). *The comprehensive high school.* New York: McGraw-Hill.

Copa, G., & Pease, V. (1992, December). A new vision for the comprehensive high school: Preparing students for a changing world. *New Designs for the Comprehensive High* School, pp. 1-16.

Copa, G. H. (1999). New designs. Retrieved on November 15, 2002 from www.orst.edu/preview/indep.html/grebb

Copa, G. H. (2000). *Impact of new designs for the comprehensive high school*. Berkeley, CA: National Center for Research in Vocational Education, 2000. (ERIC Document Reproduction Service, No. ED 438 419

Copa, G. H. (2000). Impact of new designs for the comprehensive high school. Berkeley, CA: National Center for Research in Vocational Education. (ED 438 419). Copa (2000). Learning at the Margins: Implications for Designing Learning Environments. Retrieved on November 15, 2002 from http://www.designshare.com/Research/AIA/AIA_AMS_Proceedings/Copa.htm p.3.

Cremin, L. (1961). *The transformation of the school: Progressivism in American education, 1876-1957.* New York: Alfred A. Knopf.

Cremin, L. (1975). *Public education.* New York: Basic Books.

Cremin, L. (1988). *American education: The metropolitan experience, 1876-1980.* New York: Harper & Row.

Csikszentmihalyi, M. (1988). Motivation and creativity: Toward a synthesis of structural and energistic approaches to cognition. *New Ideas in Psychology,* 6(2), 159-176.

Csikszentmihalyi, M. (1988). *Optimal experience.* New York: Cambridge University Press.

Csikszentmihalyi, M. & Nakamura, J. (1989). The dynamics of intrinsic motivation: A study of adolescents. In C. Ames, & R. Ames (Eds.), *Research on motivation in education,* Vol. 3, Goals and cognitions (pp. 79-101). San Diego: Academic Press.

Csikszentmihalyi, M. (1990). *Flow.* New York: Harper Row.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure.* Cambridge, England: Cambridge University Press.

Day, C. (2000). Planning Issues in Education. A Vision for Tomorrow's Schools. Retrieved on February 5, 2003 from http://www.kbdplanning.com/vision.html

Deci, E. L., Ryan, R. M., & Williams, G. C. (1996). Need satisfaction and the self-regulation of learning. *Learning and Individual Differences*, *8*, 165-183.

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *The Educational Psychologist*, *26*, 325-346.

Dewey, J. (1964). The child and the curriculum. In R. D. Archambault (Ed.), *John Dewey on education*. (pp. 57-89). New York: The Modern Library [Originally published in 1902 by the University of Chicago Press].

Dewey, J. (1933). *How we think.* (2nd ed.). New York: D. C. Heath & Co.

Dewey, J. (1916). *Democracy in education.* New York: The MacMillan Company.

Dewey, J. (1913). *Interest and effort in education*. Boston: Houghton Mifflin Company

DiNocola, (1996, Spring/Summer). The "ecosystem" of the school. In Building bridges: News from the national health and education consortium. Washington, DC: The Institute for Educational Leadership.

Edwards, C., Gandini, L., & Forman, G. (Eds.). (1998). *The hundred languages of children: The Reggio Emilia approach—Advanced reflections* (2nd ed.). Greenwich, CT: Ablex.

Eliot, C. (1898). Inaugural Address as President of Harvard College. October 19, 1869. In Eliot, C., Educational Reform. New York: The Century Co.

Easton, Lois (2001) Eagle Rock School Retrieved on December 10, 2002 from. http://www.eaglerockschool.org/storyfiles/geninfo. html#If%20you %20build%20it

Evans, G. W., Kliewer, W., & Martin, J. (1991). The role of the physical environment in the health and well-being of children. In H. Schroeder (Ed.), New *directions in health psychology assessment* (pp. 127-157). New York: Hemisphere.

Evans, G. W., & Cohen, S. (1987). Environmental stress. In D. Stokools & I. Altman (Eds.), *Handbook of environmental psychology* (pp. 571-610). New York: Wiley Press.

Evans, G. W., & Lovell, B. (1979). Design modification in an open-plan school. *Journal of Educational Psychology,* 71(1), 41-49.

Fielding, R. (1999). The death of the classroom, learning cycles and Roger Schank. Retrieved on January 14, 2003 from http://www.designshare.com/ Research/Schank/Scha nk1.html

Fiske, E. B. (1990, February 21). Will new school buildings be symbols of a new educational system? *The New York Times: Education*, p. 34.

Fowler, W. J. (1992). What *do we know about school size? What should we know?* Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco.

Gary, L. (2001, May). Designing for the way we work now. *The New* Yorker, pp. 67-72.

Giudici, C. Rinaldi, C. (2001). Making learning visible: Children as individual and group learners. Reggio Emilia, Italy: Reggio Children.

Grubb, W. N. (1995). *Education through occupations in American high schools Volume 1.* New York: Teachers College Press.

Grubb, W. N. (1995). *Education through occupations in American high schools Volume 2.* New York: Teachers College Press.

Hawkins, H. (1972). *Between Harvard and America: The educational leadership of Charles W. Eliot*. New York: Oxford University Press.

Hillman, J. (1996). *The soul's code.* New York: Random House.

James, W. (1958). *Talks to teachers on psychology and to students on some of life's ideals.* New York: W. W. Norton & Co. (Original work published in 1899).

Jilk, B., and Copa, G. (1997, July). The design-down process: An alternative to the traditional education specification process for defining learning environments. Scottsdale, AZ: *Council of Educational Facilities Planners*, *International*,

Katz, L., & Cesarone, B. (Eds.). (1994). *Reflections on the Reggio Emilia approach*. Champaign, IL: ERIC Clearinghouse on Elementary and Early Childhood Education.

Klonsky, M. & Ford, P. (1994, May). One urban solution: Small schools. *Educational Leadership*, pp. 64-66.

Krug, E. (1964). *The shaping of the American high school*. New York: Harper & Row.
Lackney J. (1999, December). The challenges of encouraging educational design innovation. Invited Luncheon Presentation, Annual Meeting of the Alaska Chapter of the Council of Educational Facility Planners, International (CEFPI).
Lackney, J.A. (1996). Quality in school environments: A multiple case study of environmental quality assessment in five elementary schools in the Baltimore City Public Schools from an action research perspective. Dissertation Abstracts International (UMI No. 9717142).
Lackney, J. A. (1994). *Educational facilities: The impact and role of the physical environment of the school on teaching, learning and educational outcomes*.(Johnson Controls Monograph Series Report R94-4). School of Architecture and Urban Planning, University of Wisconsin-Milwaukee: Center for Architecture and Urban Planning Research.
Lackney, J., Park, P., Witzling, L. (1994). *The cost of facility development: A comparative analysis of public and private sector facility development processes and costs*. (Johnson Controls Institute for Environmental Quality in Architecture Monograph Series Report R94-9). University of Wisconsin-Milwaukee: Center for Architecture and Urban PlanningResearch.
Lawton, M. (1999). School design can say a lot about teaching and learning. *Harvard Educational Letter*, 15(1), 5-8.
Lee, V. E., & Smith, J. (1997, Fall). High school size: Which works best and for whom? *Educational Evaluation and Policy Analysis,* 19(3), 205-227.
Littky, Dennis and Allen, Farrell (1999) Whole-School Personalization, One Student at a Time. *Educational Leadership*. 57(8), 24-27.
McLaughlin, D., & Cohen, J. (1997) *Survey Item Evaluation Report.* Washington, DC: U.S. Department of Education.
Merriam, S. (1998). *Qualitative research and case study applications in Education*. San Francisco: Jossey-Bass.
Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.
Montessori, M. (1966). *The secret of childhood.* New York: Ballantine Books.
Morgan, G. (1996). *Monet the artist speaks*. San Francisco: Collins Publishers.
Moore, G., & Lackney, J. (1993). School design: Crisis, educational performance and design applications. *Childrens' Environments,* 10 (2), 99-112.
Moore, G. (1986) Effects of the spatial definition of behavior settings on children's behavior, *Journal of Environmental Psychology*, 6:205-231.
Nair, P. (2002). But are they learning? School buildings: The important unasked questions, *Education Week,* 21 (29), 60, 42-43.
Nair, P. (2000). Schools for the 21st century are you ready? Retrieved on March 4, 2003 from http://www.designshare.com/Researchers/nair15%20rules.htm.
Nathan, J. & Febey, K. (2000). *Smaller, safer, saner, successful schools.* Washington, D.C.: National Clearinghouse For Educational Facilities.
National Association of Secondary School Principals (NASSP). (1996) Breaking ranks: Changing an American institution. Reston, VA: NASSP.
National Clearinghouse for Educational Facilities. (2000, July). *What should parents know about schools as community learning centers?* Report No. NLE20004301. Retrieved on January 23, 2003 from http://www.accesseric.org/resources/parent/clcs.html
Olson, L. (2000). Dewey: *Lessons of a century: A nation's schools coming of age*. Bethesda, MD: Editorial Projects in Education.
Rigby, C. S., Deci, E. L., Patrick, B. C., & Ryan, R. M. (1992). Beyond the Intrinsic-extrinsic dichotomy: Self-determination in motivation and learning. *Motivation and Emotion*, *16*, 165-185.
Schank, R. (2000). *Coloring outside the lines: Raising a smarter kid by breaking all the rules*. New York: Harper Collins.
Sarason, S. (1995). *Parental involvement and the political principle.* San Francisco: Jossey-Bass.
Sarason, S. (1995). *Charter schools: Another flawed reform?* San Francisco: Jossey-Jossey-Bass.

Sarason, S. (1971). *The Culture of the School and the Problem of Change*. Boston: Allyn and Bacon.
Sarason, S. (1990). *The predictable failure of school reform*. San Francisco: Jossey-Bass.
Schrage, M. (2000). *Nice building, but the real innovation is in the process*. *Fortune*. 143 (10), 276.
Schwebel, A. (1969). *Physical and social distancing in teacher-pupil relationships.* Unpublished doctoral dissertation, Yale University.
Senge, P., Kleiner, A., Roberts, C., Ross, R., & Smith, B. (1994). The fifth discipline fieldbook: Strategies and tools for building a learning organization. New York: Doubleday.
Senge, P., Cambron-McCabe, N., Lucas, T., Smith, B., Dutton, J., Kleiner, A. (2000). S*chools that learn*. New York: Doubleday.
Shapiro, B. (1998). *Perceptions of educators about school design issues.* [Survey]. Atlanta, GA: Heery International.
Sizer, T. (1992). *Horace's school*. Boston, New York: Houghton Mifflin.
Sizer, T. (1984). *Horace's compromise: The dilemma of the American high school*. Boston: Houghton Mifflin.
Stamps, David (1998). Learning Ecologies. *Training*, 35 (1) pp. 32-38.
Steinberg, A. (1998). *Real learning, real work*. New York: Routledge.
Taylor, A. (1998, Fall). Physical environments do affect learning and behavior of students. *Mass Magazine,* 11, 46-54.
Taylor, A., & Gousie, G. (1988, July-August). The ecology of learning environments for children. *CEFP Journal,* 23-28.
Taylor, A. (Ed.). (1983, Summer). Effects of the physical environment on learning (symposium). *Exceptional Education Quarterly,* 4, 1-115.
Walberg, H. J. (1993). Losing local control of education: Cost and quality implications. *Heartland Policy Study*, No. 59, 4.
Wasley, P., & Fine, M. (2000). Small schools and the issue of scale. New York: Bank Street College of Education.
Wasley, P., Fine, M., Gladden, M., Holland, N., King, S., Mosak, E., & Powell, L. (2000). Small schools: Great strides: A study of new small schools in Chicago. New York: Bank Street College of Education.
Wilson, F. R. (1998). *The hand: How its use shapes the brain, language, and human culture.* New York: Pantheon Books.
Zilversmit, A. (1993). *Changing schools. Progressive Education Theory and Practice, 1930-1960*. Chicago: The University of Chicago Press.

Appendix A

National Architects and Designers Consulted

Steven Bingler – Concordia
Ted Rowse – T. Rowse Associates
Jeffrey Lackney – University of Wisconsin
Herb Childress – Bay Area Coalition of Equitable Schools
George Copa – Portland State College
Steve Durkee – Steve Durkee Associates
Gaylord Christopher – Concordia Associates
David Stevens – High Tech High Learning
Bobbie Hill – Concordia Associates

Appendix B

Interview Questions

What do you view as the Met's key program design elements?

Thus far, how has the design process accommodated these key design elements?

What barriers have impeded the accommodation of these key design elements?

What challenges do you see in creating an architectural design that accommodates the Met's key program design elements?

How would you change the facilities design process to better accommodate the design changes?