Educational Adequacy Assessments:
Making A Difference Where Our Children Learn

Since the mid-80s, barely a day has passed without civic leaders calling for a new initiative, without the phrase *"…for the 21st Century."* As education issues continually rise on the national political agenda, the public has looked to school boards and visionaries for a new 21st century educational paradigm. The problem is the majority of schools in the existing portfolio are barely capable of supporting the instructional programs and technology initiatives of the 90's, much less the innovative 21st century concepts currently being discussed in the educational arena. ***Educational adequacy,*** *defined as the degree to which a school's facilities can adequately support the instructional mission and methods, is an essential yet often overlooked element in many district's attempts to prepare aging facilities for a 21st century educational paradigm.*

While a majority of the education debate focuses on designing, specifying, and constructing **new** schools **"*…for the 21st Century***", approximately 98% of our 21st century national school portfolio is already in place. The life span of a typical school is generally 50 years; therefore we theoretically replace 2% of our schools each year. At this rate, by the year 2025, we will replace or more likely recondition half of the nation's

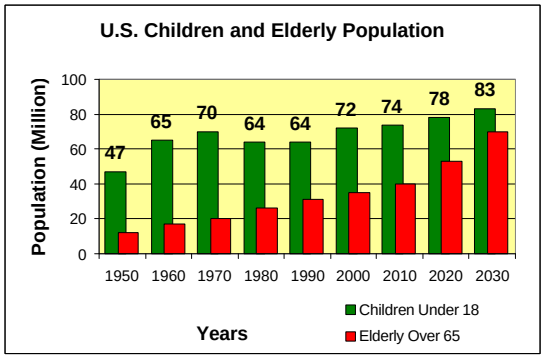

Figure 1: School Age Population Growth

schools. According to U.S. Census figures, the annual school age children population growth from 1999 to 2025 is projected at just under one half of one percent for a total 25 year growth of only 15%. [Figure 1] While population growth and associated new school construction in some areas is impressive to say the least, renovation, and in some cases rehabilitation, of existing schools will likely continue at a pace over three times that of new school construction. [Figure 2] The questions for school renovation are two-fold. First, what can and indeed must be done to bring a particular school to a standard of adequacy that meets educational and instructional needs? And second, at what point does a school's inability to meet educational and instructional needs suggest that it should be altogether replaced?

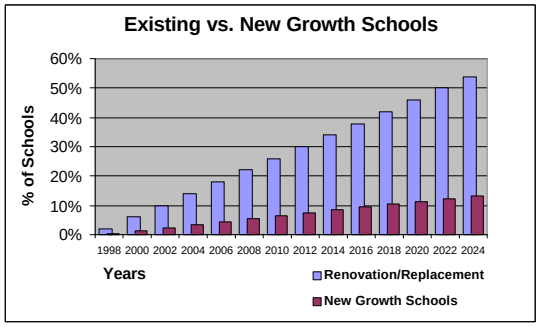

Figure 2: Existing Schools vs. New Growth Projection

Educational and Instructional Needs

*More and more districts are assessing the educational adequacy of their facilities as part of an overall facility assessment program***.** In broad terms, educational adequacy measures the extent to which the facility supports current and anticipated teaching missions. Educational adequacy criteria include conditions that can be realistically remedied as part of general renovation, as well as functionally obsolete conditions which may not be economically feasible to remedy; these conditions include incorrectly sized teaching spaces, the lack of appropriate plumbing facilities, and undersized core spaces.

To comprehensively assess educational adequacy, it is first necessary to understand the components which affect the instructional or teaching program. These components can generally be formulated into district-wide standards or guidelines and bridge the gap between the architectural design program and the district's educational specifications. There may be numerous criteria which contribute to educational adequacy; however, they generally fall into eight major categories:

- **Capacity**: Ability of core facilities to meet needs of the student population. Core facilities may include restrooms and toilets, dining facilities, libraries, and administrative areas. Capacity issues also address site utilization. It is critical to consider the programs at a particular campus and the impact these programs have on classroom inventory and student teaching stations. It is also important to evaluate the use of permanent versus temporary structures.
- **Support for Programs**: Provision of special spaces or classrooms that support specific curriculum offerings such as music, sports, science, technology, and gifted and talented programs. Support for programs may also include enclosed play areas or multi-purpose spaces which enhance school flexibility.

ES Students = 530	Std.	Perm.	Requirement		Actual				%
Program Support Space	Sq.Ft.	Pref.	Sq.Ft.	Qty.	Sq.Ft.	Qty.	Loc		Adequate
Art/Visual Art Classroom	800	Yes	800	1	-	-		=	-
Basic Skills Classroom	800	Yes	800	1	-	-		=	-
Computer Lab	800	No	800	1	786	1	P	=	0.98
Exploratorium	900	No	900	1	-	-		=	-
Multi-Purpose Room	2,800	No	2,800	1	-	-		=	-
Music Clasrooms	1,000	No	1,000	1	720	1	T	=	0.72
Performance Platform	500	Yes	500	1	443	1	P	=	0.89
Resource Classroom	750	No	2,250	3	720	1	T	=	0.32
Special Population Classroom	1,125	Yes	2,250	2	720	1	T	=	0.26

Temporary Location Merits 20% Reduction in Score — Score **35.2**

Figure 3: Support for Programs

- **Technology**: Presence of infrastructure, data distribution/storage and equipment within classroom and laboratory settings. This typically does not include provision of actual computers in the classroom but does address the ability to

support emerging technology. This might include local area network cabling, video distribution systems, electrical outlets, and projection or video display screens.

- **Supervision and Security**: Extent to which physical configurations help or hinder building operation. This includes site buffers, security fencing, sight lines, lighting, and obstructions in instructional spaces that make supervision difficult or impossible.

- **Instructional Aids**: Presence of necessary equipment within teaching spaces including teacher storage, student storage, writing and tack surfaces, sinks, demonstration tables and fixed audio/video equipment. Instructional aids might also address surface heights, counter heights, and types of writing surfaces.

Instructional Aid Requiremer	Quantity Present	÷	Total Required	=	% Adequate	*	Weight	=	Weighted Score
Fixed Television	1	÷	28	=	4%	*	3.4%	=	0.12
Fixed Projection Screen	26	÷	27	=	96%	*	9.1%	=	8.76
Writing Surface Length	24	÷	27	=	89%	*	16.6%	=	14.76
Writing Surface Height	18	÷	27	=	67%	*	2.5%	=	1.67
Tack Space	26	÷	26	=	100%	*	2.1%	=	2.10
Teacher Storage	26	÷	27	=	96%	*	8.6%	=	8.28
Student Cubbies	174	÷	308	=	56%	*	10.6%	=	5.99
Student Coat Hooks	22	÷	308	=	7%	*	0.9%	=	0.06
Sinks in Classrooms	1	÷	15	=	7%	*	25.7%	=	1.71
Toilets in Classrooms	1	÷	5	=	20%	*	16.9%	=	3.38
Adjacent Storage	1	÷	1	=	100%	*	0.6%	=	0.60
Prep/Workroom	1	÷	1	=	100%	*	3.0%	=	3.00
							Score		50.4

Figure 4: Instructional Aids

- **Physical Characteristics**: Primarily size and shape of individual teaching spaces. The total area and aspect ratio, derived by dividing the shortest side of a classroom by the longest side, impact the adequacy of a teaching space. Ceiling heights might also be a consideration. Unfortunately, these criteria are cost prohibitive to remedy in most circumstances.

- **Learning Environment**: Degree to which learning areas are comfortable, well lighted, odor free, controllable and quiet.

- **Relationship of Spaces**: Proximity of instructional spaces to support areas like libraries, rest rooms, and student dining and recreational areas. It is generally

thought that dining and recreation areas should be offset or remote to reduce distraction, while learning resource centers and libraries should be centrally located close to the school's core.

Within each category, the criteria relevant to a particular school district should be identified and weighted to determine a category score. The categories are then summarily weighted to arrive at the educational adequacy score. A typical weighting might include 15% for capacity, 20% for support for programs, 20% for technology, 10% for supervision and security, 20% for instructional aids, 5% for physical characteristics, 5% for learning environment, and 5% for relationship of spaces.

Criteria		Weighting	*	Score	=	Total Points
1	Capacity	15%	*	47.0	=	**7.1**
2	Support For Programs	20%	*	35.2	=	**7.0**
3	Technology	20%	*	59.0	=	**11.8**
4	Supervision and Security	10%	*	76.7	=	**7.7**
5	Instructional Aids	20%	*	50.4	=	**10.1**
6	Physical Characteristics	5%	*	80.7	=	**4.0**
7	Learning Environment	5%	*	85.8	=	**4.3**
8	Relationship Of Spaces	5%	*	85.8	=	**4.3**
				Total Score		**56.3**

Figure 5: Weighting of Major Categories

Educational adequacy is typically measured on a scale from 0 to 100, with poor schools scoring less than 35 and adequate schools scoring above 75.

Magellan Consulting, Inc., has developed a database (Microsoft Access) using visual basic modules to calculate and generate scores based on project-specific weighting assigned to each criteria and category. In the assessment process, standards and measurement criteria are developed first. Then collection forms are

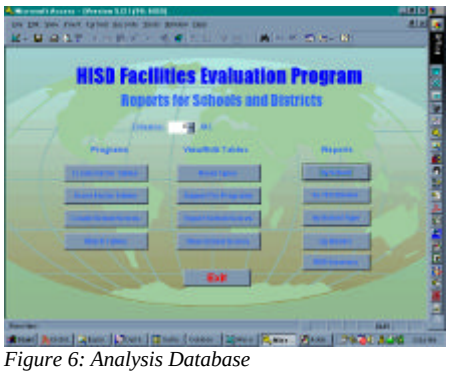

Figure 6: Analysis Database

adjusted and each school is visited to complete a room-by-room survey and inventory of the criteriaThe information from these forms is then entered into the database and the program creates the score that is used to rank and/or prioritize schools. The program will allow consideration of scores before renovations and after renovations by designating which repairs the district plans to correct. The program also prints a comprehensive listing of all educational adequacy deficiencies with a suggested repair solution and an estimated cost to repair. These repair deficiencies can then be incorporated into the building condition assessment findings to arrive at a comprehensive cost for renovating the facility.

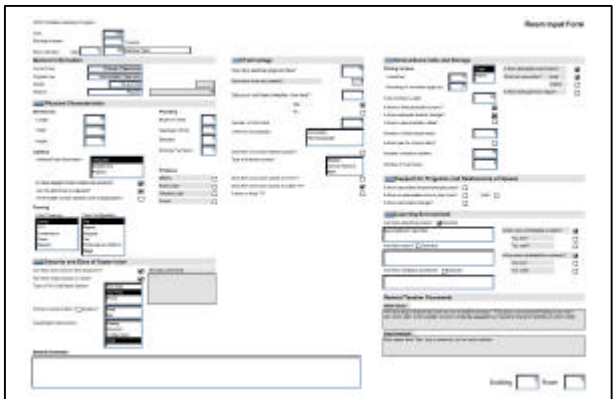

Figure 7: Sample Data Collection Form

Repair or Replacement

School districts are awakening to the looming problem of aging facilities, particularly those constructed to house the post World War II baby boom generation. ***Those facilities, now 35-50 years old, are in need of significant renovation and in many cases replacement.*** Growing districts are further challenged by the need to provide new schools for expanding populations. All of this in the face of greater public attention to the accountability of elected officials and increased scrutiny of tax dollar spending. School districts are finding it increasingly difficult to bring new space into the facility inventory and even more difficult to fund new construction to replace or

retirement of older facilities, thus forcing wholesale renovation of those aging buildings. Determining whether to renovate or replace a facility is a very difficult decision, fraught with emotional and political considerations. The most significant method to at least justify the decision is through a comprehensive facility assessment. The school assessment industry is booming, and every district with an average facility age over 35 years should be contemplating an assessment if they have not completed one within the last five years.

A building condition assessment evaluates the general health of physical facilities by identifying and prioritizing deficiencies that require correction for continued long-term use of the school. Inspections are typically organized into architectural, civil, structural, mechanical, electrical, and plumbing disciplines, and typically include all of the major Construction Specifications Institute (CSI) divisions. At the conclusion of the building assessment, renovation requirements are collected into renovation costs for each school facility.

One industry recognized measure of general building health is the Facility Condition Index (FCI). In simple terms, the FCI is the required renovation cost divided by the cost of building replacement (e.g. $1,500,000 of renovations for a school with a replacement cost of $5,000,000 results in an FCI of .30). An FCI below .10 indicates a healthy school; an FCI above .10 generally indicates the need for some level of renovation; and an FCI greater than .65 indicates the need to consider replacement of the school. On the surface it might seem that facilties with an FCI of .65 would be

nonexistent. However, costs of renovating facilities that have been neglected or are nearing the end of their useful life can rise quickly. A school that needs complete replacement of the roof and HVAC system, particularly if hazardous materials are present, can easily reach the .65 threshold when other incidental needs are included. *When renovation estimates exceed 65% of the replacement cost of the facility, the question of educational adequacy moves to the forefront of the debate, and can be a crucial element in the replacement decision process.* [Figure 8] Unfortunately, building assessments typically address only the physical condition and necessary remedies for maintaining building integrity, altogether failing to address the requirements to remedy educational adequacy deficiencies and maintain teaching or instructional integrity.

Economic Analysis
A key judgement for school districts is determining the FCI threshold above, which a facility is considered for replacement. Analysis of alternatives over a 25-35 year period should be conducted, taking into account differences in operating costs, future maintenance requirements and end-of-period replacement cost. The threshold should reflect intangible differences, including historic value, neighborhood concerns, availability of land for a new facility, the anticipated enrollment for the school, and educational adequacy before and after renovation.

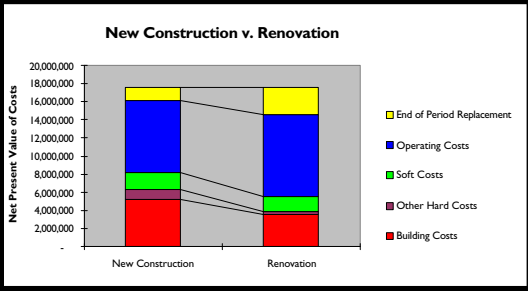

Figure 8: Economic Analysis

Educational adequacy is of critical value when districts are faced with renovation vs. replacement decisions because it indicates how well the renovated school will support teaching curricula, before and after renovation. Older and/or ill-conceived schools may very well have low educational adequacy scores, even after full renovation. Decision-makers must decide the cost trade-off of using an educationally inferior facility for long-term use. And no one would want to spend millions of dollars renovating a

school with a low adequacy score only to have a newly renovated, but educationally obsolete school facility.

Adequacy Standards or Guidelines

The primary challenge of an educational adequacy assessment is developing the educational standards or guidelines used for measurement and subsequently determining the weight of those standards. To determine weighting, the age of facilities, culture, curriculum, and issues of significant public concern should be taken into consideration. Adequacy standards are different from educational specifications and educational specifications vary in their usefulness to serve as discrete measurements for educational adequacy criteria. [Figure 9] Most districts tend to develop educational specifications in preparation for new school construction or, in larger districts, for an extensive construction program, but these specifications do not deal with the specifics necessary to objectively evaluation instructional spaces. In any case, the educational specifications and the comprehensiveness of those specifications play a primary role in the level of effort required to develop the analysis and weighting of criteria. Detailed standards should be developed for a comprehensive adequacy assessment to be effective as an objective decision making tool.

Adequacy Criteria

	Site Level Considerations	Building Level Considerations	Room Considerations
Capacity	Planned Enrollment Design Capacity Open Area Site Capacity Parking Capacity	Area of Building (SF) Transportable Building Area Core Capacity	Enrollment / Core Capacity Enrollment / Classroom Capacity Enrollment / Media Center Capacity Number of Classrooms
Support for Programs		Art/Visual Art Classroom Basic Skills Classroom Computer Lab Exploratorium Multi-Purpose Room Music Clasrooms Performance Platform Resource Classroom Special Population Classroom	
Technology	Utility Services	Cable TV Infrastructure	Media Center LAN Computer/Math Lab LAN Classroom Data Port Access LAN Electrical Plugs
Security and Supervision	Perimeter Fencing Buffered Playground Fenced K Playground Segregrated Bus Drop Off Bus Lane Adjacent to the Building Bus Staging Does Not Block Traffic On-Site Car Pool Drop Off Adequate Car Pool Staging Visibility of Parking	Building Configuration Extent of Interior Corridors Permanent Buildings No Nooks or Unsafe Places	Communication System Locking Door View Obstruction Vision Panels in Doors Tamper Proof Lighting
Instructional Aids		Adjacent Storage Prep/Workroom	Fixed Television Fixed Projection Screen Writing Surface Length Writing Surface Height Tack Space Teacher Storage Student Cubbies Student Coat Hooks Sinks in Classrooms Toilets in Classrooms
Physical		# Floors Required Elevator(s) # Corridors Corridor Widths	Area Aspect Ratio Floor Surface Type Ceiling Height
Learning Environment	Noise Odors	Noise Odors Heating and Cooling	Lighting Quality Adjustable Lighting Daylight Control Appropriate Floor Covering
Spaces	Ease of Acess to Front Door Location of K-Playground	Location of Media Center Location of Student Dining Location of Main Office Location of Technology Hub Wayfinding	Room Signage

Figure 9: Adequacy Criteria

Back to 21st Century Schools

Implicit in any new approach to education is fundamental changes to teaching missions and techniques, as well as the related impacts to the physical facilities. History shows

that facilities are rarely upgraded as quickly as the institutions they house. We face the reality that at the dawn of the 21st Century almost all schools will have been constructed in the 20th Century. The vast majority of these schools will have been constructed before the public began focusing on the millennium event as an opportunity to challenge some of the fundamental institutions of the urban fabric, and many were created well ahead of the available technology frequently used in even today's schools. In all likelihood ***we will have to wait another 25 years before the majority of schools will truly be "21st Century schools."*** Given this, the challenges that face architects, construction specifiers, contractors, and educators alike, are significant. How can architects reshape existing schools to meet the needs of future educational practices? How can construction specifiers bridge the gap between current or past products and the emerging product technologies that will impact the classroom and particularly the students? How can contractors integrate their knowledge of construction techniques and building technology into the renovation design process, before it is too late? And possibly the most significant question: How can educators in the 21st Century shape instructional programs that respond to the educational, cultural, social and economical constraints of the coming times, in facilities that were designed and built when the educational environment was radically different? Be assured the rules will continue to change at increasing frequency as we slowly renovate the nation's school portfolio and make a difference where our children learn.

Biography

Donald T. (Sam) Wilson, Jr.

Mr. Wilson is a founding principal of Magellan Consulting, Inc., a consulting firm providing management and project planning services as well as project financing. Mr. Wilson has recently completed several educational adequacy assessments including comprehensive programs for Houston Independent School District and Galena Park Independent School District.