



Center for Innovative School Facilities of Oregon

A Project of Innovation Partnership

Top 10 Lessons Learned in School Design & Construction

The following was excerpted from the comments Steve Brucker, an expert in the field of school construction. Steve offers his own unique point of view on the topic of school construction. This information was prepared for the 2008 Bonds & Ballots Conference in Salem, OR.

Building the Best Students

Building the Best Students is the business of Oregon's schools, which includes teachers, staff members and administrators. This is accomplished by delivering educational excellence throughout Oregon's schools. The quality of Oregon's school facilities directly contributes to, or detracts from, the business of *Building the Best Students*. The following 10 lessons are key steps in delivering high performance/low maintenance buildings that provide environments conducive to "Building the Best Students." These lessons can be applied to current and near term challenges.

Lesson 1: Cost Escalation

Cost escalation affects every market in America. The price of oil, for example, has shot up since 2002 while monetary policy, as measured by the federal funds rate, has seen a decrease in this same time. Commercial and industrial loans and the price of construction materials, which pertain to school buildings, have both shown increases in the past four years. This increase can alter the approach to school design and building since it adds to the overall budget of a project.

When acquiring funds through bonds or ballot measures, components for escalation based on current and projected market conditions need to be included. Risk and exposure need to be minimized, as well. Shortening the time to market, the time between the bond measure and project completion, can accomplish this. It is also important to transfer the cost risk. Changing the bond measure system to address current and project cost issues will help keep cost escalation to a minimum. This can be achieved by combining the operating budget for the building with the capital budget for the term of the bond measure.

Lesson 2: Balance Design with Function

Many school facilities programs are similar and the design solutions for program elements vary widely. As a result, project teams spend an inordinate amount of time balancing the value of design solutions with stated functions. Project teams also primarily use objective data to evaluate solutions that have a substantial amount of subjectivity.

To achieve balance between design and function, it is important to take the time and define what success means for the project and project team. Determining the guiding principles of the project is also crucial to achieve this balance. These principles can include determining those elements that are essential for success, what elements are important and what elements that could be deferred, deleted or substantially modified, if necessary, to meet budget constraints. Since the criteria for the project will be determined in advance, the decision-making can be streamlined, saving valuable time for the project.

Lesson 3: Measure Quality/Determine Value

There has been a recent limited consistency in the way project teams optimize their programs. To help optimize, teams need to turn to the bond money per square foot bond measure, the simplest form of measure. It is often questioned if the mission of *Building the Best Students* has a definite set of measurements. If it does, the question of which particular measurements have universal application can be evoked. Understanding these measurements and their application will help clearly measure the quality of a school's design and construction. The mission, then, is to create high performance/maintenance buildings rather than simply creating the greatest square footage of space.

When dealing with square footage, it is important to remember that there is more than just one yardstick or method to measure with. The first method is the square foot model for a school building that incorporates both the square feet of a classroom per student and the square feet of flex space per student. The next method, adapted from Green Building, is the human model. This model takes into account the number of absentee hours per total student hours and the number of sick days per total student days. The third and final model is the efficiency model that employs a usage ratio. This ratio is the total number of building hours used over the total building hours available. These three models will help measure the quality of the school building and help determine its value by figuring out how students and faculty actually use their facilities.

Lesson 4: Learn from Other Industries

Projects and construction done by other industries and school districts can act as a helpful guide and inspiration for a school's future project. Some school districts have even developed prototype school designs. However, most of these projects are one-offs that are never fully utilized by another school district. However, these prototypes can offer solutions for building elements and their programs can be applied to multiple projects. This can hopefully develop standardized building criteria that can help deliver high performance/low maintenance building systems. It is also important to remember that site costs can be a substantial part of the project cost.

Setting standards for building design and construction can reduce construction costs, shorten turnaround times, improve building functions and deliver consistency results. Tightening site selection criteria can reduce projects costs. Site costs can range anywhere from \$20 per square foot to \$50 per square foot.

Lesson 5: Maximum Benefit from Suppliers

There are a number of suppliers in the state of Oregon involved in the process of delivering new and renovated facilities to the public. In the November 2006 election, approximately 18 general obligation bonds were approved. The value of these approved bonds was close to \$800 million.

To help verify pricing assumptions, school districts need to collaborate in the pre-bond measure phase of planning. As well, these districts can collaborate in the post-bond measure phase to coordinate schedules and competition for resources. Collaboration with school districts strives to share lessons, improve delivery and enable project teams to deliver a better product at a lower cost.

Lesson 6: Partnerships

Partnerships can create an avenue to extend the reach of school bond dollars. Different users or school districts can collaborate to build facilities that collectively meet each other's needs. Entities or users can work together to offset initial capital costs and/or operating costs and help multiple user groups reach full utilization of facilities and site improvements.

Potential partnerships are typically identified through long range master plans or strategic facility studies. Partnerships can leverage facility funding by focusing on shared needs. Creative solutions within the partnership can expand the benefits for both partners. Usually, the gestation period for partnerships can take 1-5 years. However, staff turnover "partnership sponsors" can delay or void partnership opportunities.

Lesson 7: High Performance Buildings

Of all the value engineering targets, high performance/low maintenance elements of buildings are first and foremost. The value of sustainable practices and high performance buildings are not universally understood or applied to design solutions, programs and cost evaluation models, thus hindering the overall perception of sustainable building practices. A common misconception about sustainable building is that the initial cost of a high performance/low maintenance building is too high. Most argue, however, that a school district can't afford not to build a high performance/low maintenance building, especially considering the benefits and savings that it will bring.

It is important for a school district to use the correct formula to evaluate the benefits of high performance/low maintenance buildings and facilities. This includes determining what the school can benefit from most and pooling resources towards these benefits. Educating staff, administrators, students and funders about the benefits of high performance/low maintenance buildings will help evaluate those benefits. It is important to consider long term operating costs when making capital cost decisions. As well, the human element and the original goal of *building the best students* must be taken into consideration.

Lesson 8: High Performance Teams

The delivery of design and construction services is a people business in that the projects' success lies in the teams of people delivering the project. Simply assembling a group of seemingly

qualified individuals does not necessarily create a high performance team. A high performance team is built on a common vision and requires commitment, coaching and leadership.

It is important to assemble the project team early to affect positive outcomes for the project. Being able to understand the project requirements and time commitments and also taking the time to assemble the right people to deliver the project will add to its strength and success. Defining the project's story, or the common vision and criteria, early will ensure that individuals are informed and will understand the changes as the team grows.

Lesson 9: Renovations are Challenges

Renovations present unique challenges in the form of unexpected construction. This construction adds to both the time and money of a project. Logistics and parking are two parts of renovating that can get overlooked but have a great importance on a project. Hazardous materials can often derail project schedules and budgets. Renovations for seismic stability, handicap access, roofing updating and systems upgrades can create a major political challenge for a building since these are all features a building must have as mandated by the law. Additions that follow leapfrog remodels may appear easy but are, in fact, very difficult and expensive to accomplish.

What is most beneficial to renovations is productivity. Productivity dictates how quickly and how efficiently the renovation process will go. This productivity can be broken up into three parts, the first of which is actual production itself. This production accounts for 30% of the productivity process. 40% of the process is dedicated to waiting for approvals and funding while the last 30% of this process is dedicated to moving equipment and workers to the site.

Lesson 10: Not Just a Building

Permitting and land-use issues take up most of the resources of a project in its pre-planning stages. Without the proper permits and utilization of the land, a building cannot be either built or renovated. Therefore, permitting and land-use issues are the number one reason for project delays. These issues are not just limited to new construction and can affect renovations being made to an existing building.

Simply being aware of local jurisdictions, their requirements and the length of time it takes to secure permits can help curb and predict delays. It is essential to also think beyond the building itself and to consider if the building is on the best site. Factors that determine if a site is adequate are cost, access, traffic implications and safety, most central location and most useable location. Knowing the area around a site can help avoid delays and added cost. This includes being aware of any wetland issues, service access issues or contaminants that need to be mitigated. Most importantly, the scope and improvements for a site need to be understood in advance of submitting the budget.