Facility Assessment Factors

Setting the physical stage for high quality teaching and learning environments

Research Information Grid

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Optimal maintenance scheduling of local public purpose buildings

Arnt O. Hopland and Sturla F. Kvamsdal. INSTITUTT FOR FORETAKSØKONOMI DEPARTMENT OF BUSINESS AND MANAGEMENT SCIENCE Norges Handelshøyskole Norwegian School of Economics - 36 2014 - ISSN: 1500-4066 November 2014

We formulate the maintenance scheduling decision as a dynamic optimization problem, subject to an accelerating decay. This approach offers a formal, yet intuitive, weighting of the trade-offs involved when deciding a maintenance schedule. The optimal maintenance schedule reflects the trade-off between the interest rate and the rate at which the decay accelerates. The prior reflects the alternative cost, since the money spent on maintenance could be saved and earn interests, while the latter reflects the cost of postponing maintenance. Importantly, it turns out that it is sub-optimal to have a cyclical maintenance schedule where the building is allowed to decay and then be intensively maintained before decaying again. Rather, local governments should focus the maintenance either early in the building's life span and eventually let it decay towards replacement/abandonment or first let it decay to a target level and then keep it there until replacement/abandonment. Which of the two is optimal depends on the trade-off between the alternative cost and the cost of postponing maintenance.

Public School Principals Report on Their School Facilities: Fall 2005 - Statistical Analysis Report January 2007

Bradford Chaney, Laurie Lewis, Westat and Bernard Greene, Project Officer, National Center for Education Statistics. NCES World Wide Web Electronic Catalog is http://nces.ed.gov/pubsearch

The extent to which school buildings support education has been an important topic for policymakers. One issue is the physical condition of the buildings, particularly as school buildings age. Another is the ability of the buildings to accommodate shifts in the nation's population: some communities have experienced decreases in school-age population due to outmigration or shifts in the age distribution, leading to below-capacity enrollment in their schools, while others have experienced large increases in population and have needed to build new schools, expand existing ones, or put more students in buildings than the buildings are designed to serve. This report is based on a survey of school principals conducted by the National Center for Education Statistics (NCES) in the Institute of Education Sciences, U.S. Department of Education. It presents current information on the extent of the match between the enrollment and the capacity of the school buildings, environmental factors that can affect the use of classrooms and school buildings, the extent and ways in which schools use portable buildings and the reasons for using them, the availability of dedicated rooms for particular subject areas (such as science labs or music rooms), and the cleanliness and maintenance of student restrooms. The data were collected from mid-September 2005 through late January 2006 from public elementary and secondary schools in the 50 states and the District of Columbia. T-tests were used to test for statistical significance.

Code Compliant School Buildings Boost Student Achievement

Much of the focus in the literature in raising student achievement has included parental involvement, principal leadership, quality of instruction, students' socioeconomic status, curriculum, and use of technology. Limited empirical research relates the condition of the school building as a variable that affects student achievement. Furthermore, there is no research that has examined the impact of building codes on achievement outcomes in the state of Florida. This research determined whether academic achievement of 4th-, 8th-, 9th-, and 10th-grade students as measured by the mathematics and reading subtests of the Florida Comprehensive Achievement Test (FCAT) increased in new school buildings compliant to the 2000 Florida State Requirements for Educational Facilities. A causal-comparative design determined whether the independent variables, old and new school building influenced student achievement as measured by students' FCAT mathematics and reading subtest scores. The control group was two cohorts of 4th-, 8th-, 9th-, and 10th-grade students who attended school in old buildings. The experimental group was two cohorts of 4th-, 8th-, 9th-, and 10th-grade students who attended school in new buildings. Transition from an old school into a new school was the treatment. Two hypotheses were formulated for testing and the research question for the inquiry was whether the percentage of students passing the FCAT

mathematics and reading subtests increases after transitioning from an old school building into a new 2000 UBC (Uniform Building Code) compliant facility.

PRIORITIZATION OF 31 CRITERIA FOR SCHOOL BUILDING ADEQUACY

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American Civil Liberties Union Foundation of Maryland Baltimore, MD 21211 410-889-8555 - January 5, 2004

I have been asked by the ACLU of Maryland, which represents the plaintiffs in the Bradford v. Maryland State Board of Education case, to review the 31 criteria for school facilities established by the Maryland Task Force to Study Public School Facilities and to recommend priorities for those criteria in light of the available research on the links between conditions in school buildings and student achievement. Based on my own studies, my review of pertinent research studies, and my background and experience in the field, I have recommended a set of priorities among the criteria based upon the extent to which an element impacts student academic achievement. I recommend that the highest priority be given to those elements which have a demonstrated and significant impact on student achievement and on those elements that directly relate to student safety.

Below, I first summarize generally the research generally demonstrating the link between school condition and student achievement, and the link between the age of a facility and achievement. Then, I explain why, in my opinion, it is crucial for Maryland to address issues related to student safety first, in conjunction with the criteria most directly related to student achievement. Then, I rank several of the criteria that research demonstrates are most directly linked to student achievement, and summarize some of the research related to those criteria. All of my opinions are explained in greater detail in the accompanying report.

The evaluation of physical learning environments: a critical review of the literature

This article critically reviews the methodologies and methods that have been used for the evaluation of physical learning environments. To contextualize discussion about the evaluation of learning spaces, we initially chart the development of post-occupancy evaluation (POE) for non-domestic buildings. We then discuss the recent evolution of POE into the broader evaluative framework of building performance evaluation. Subsequently, a selection of approaches used to evaluate higher education and school learning environments are compared and critically analyzed in view of contemporary approaches to teaching and learning. Gaps in these evaluative approaches are identified and an argument is put forward for the evaluation of physical learning environments from a more rigorous pedagogical perspective.

Capital Renewal and Deferred Maintenance Programs

Facilities management responsibilities include programs for acquiring new capital assets; programs governing operations, maintenance, and repairs; capital renewal programs; and deferred maintenance programs. Organizational structures for managing these programs vary. Larger institutions may divide the responsibilities between operations and maintenance management and facilities planning departments; at smaller institutions a facilities department may manage both responsibilities. Because the programs emerge from two concepts: accounting and plant operations: there is a built-in confusion about their meanings. The issue of deferred maintenance further complicates clear delineation of terms and operational applications to achieve the basic goal: extending the life of existing facilities or replacing them with new facilities.

Prioritization Model for Rehabilitation of Public School Buildings in California

The condition of the nation's kindergarten through 12th (K-12) grade public school buildings is considered to be in bad shape. To bring back the condition of the American K-12 schools to an acceptable level, it is estimated that about $320 billion may be required. As a starting effort, $40 billion was allocated by the Federal Government to improve the current condition of public school buildings. To properly manage the expenditure of this fund, a prioritization system is required. Existing school prioritization systems in the State of California are based on the subjective judgment of decision-makers and their manual interpretation and manipulation of data collected by their subordinates. This current prioritization practice lacks a structured methodology that rationalizes its outcomes. It may also lead to misleading conclusions, and accordingly, misuse of available resources, especially in challenging cases where the conditions of multiple school buildings may be very similar. This article presents a computer-based prioritization system for the rehabilitation of school buildings in the State of California. The system augments the current school condition data collection process, uses the experience of industry experts, and assists in allocating rehabilitations funds in a rational manner that assures addressing the most deteriorated schools.

A Plan for Evaluating the District of Columbia's Public Schools: From Impressions to Evidence

Committee on the Independent Evaluation of DC Public Schools; National Research Council. ISBN 978-0-309-20936-6 -
http://www.nap.edu/catalog.php?record_id=13114

In 2007, the District of Columbia made a bold change in the way it governs public education with the goal of shaking up the system and bringing new energy to efforts to improve outcomes for students. The Public Education Reform Amendment Act (PERAA) shifted control of the city's public schools from an elected school board to the mayor, created a new state department of education, created the position of chancellor, and made other significant management changes. PERAA also mandated an independent, comprehensive, 5-year evaluation to determine "whether sufficient progress in public education has been achieved to warrant continuation of the provisions and requirements of this act or whether a new law, and a new system of education, should be enacted by the District government. . . ."

To plan that evaluation, the Committee on the Independent Evaluation of DC Schools was convened by the National Research Council in response to a request from the City Council of the District of Columbia. The committee was asked not to conduct the evaluation, but to provide initial guidance on the focus and structure of the required evaluation. The work included identifying available data and assessing its quality and utility; developing a preliminary set of indicators; engaging with various stakeholder groups, including civic leaders, parents, researchers, and national and local reform experts; and exploring the desirability, feasibility, and scope of the optional next phases of the evaluation.

This report documents the committee's plan for the evaluation. It lays out a plan for a comprehensive, long-term program of evaluation that is designed not only to examine short-term effects of the changes made under PERAA, but also to provide the District with a structure for continuous, independent monitoring of important features of its school system. The plan is based on the committee's review of preliminary data and on its conclusion that first impressions of the implementation of PERAA and its effects, though informative, are not sufficient as a basis for decisions about PERAA or continued improvement of the city's education system.

The committee agreed on several basic assumptions and goals that have guided our work. First, although many U.S. cities have undertaken significant reforms to change their schools and researchers have examined what they have done, there is no established model for evaluating a district involved in reform—or, for that matter, any district. Second, school districts are judged primarily on the academic achievement of their students, but achievement depends on how effectively a school district accomplishes its many responsibilities and pursues many valued educational outcomes. Third, we interpreted PERAA's requirement for an evaluation broadly: to establish for the residents and leaders of DC a sustainable ongoing program of evaluation that provides reliable information they can use to improve the school system continuously, regardless of future political or personnel changes. Last, the committee approached the most challenging part of its charge—to explore the effects of the reform legislation itself—by distinguishing among the intent of the reform, as articulated in the law; its implementation, that is, the actions taken by the DC Public Schools (DCPS) and other responsible city agencies; and its effects on student learning and other valued outcomes.

Condition of America's Public School Facilities: 2012–13 - First Look

Debbie Alexander and Laurie Lewis Westat, and John Ralph Program Director National Center for Education Statistics. Alexander, D., and Lewis, L. (2014). Condition of America's Public School Facilities: 2012–13 (NCES 2014-022). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved [date] from http://nces.ed.gov/pubsearch.

This report provides nationally representative data on the condition of public school facilities. The National Center for Education Statistics (NCES) previously collected data on this topic in 1999 (Lewis et al. 2000). The study presented in this report collected information about the condition of public school facilities in the 2012–13 school year. Specifically, the survey covered the following:

Whether the school had permanent and portable (temporary) onsite buildings;

- The condition of 17 building systems/features in the permanent and portable (temporary) onsite buildings;
- The condition of seven outdoor features at the school;
- The overall condition of the permanent and portable (temporary) onsite buildings;
- The estimated total cost of all repairs/renovations/modernizations required to put the school's onsite buildings in good overall condition, and the sources on which the cost estimate was based;
- How satisfactory each of eight environmental factors was in the permanent and portable (temporary) onsite buildings;
- The year in which the school's main instructional building was constructed, the year of the last major renovation of the main instructional building, and the year of the last major building replacement or addition at the school;
- Whether any major repair/renovation/modernization work was currently being performed at the school; • Whether various construction projects were planned for the school in the next 2 years;
- Which of 17 building systems/features at the school, if any, had major repairs, renovations, or replacements planned for the next 2 years, and if work was planned, the main reason for the planned major repair, renovation, or replacement;
- Whether there was a written long-range educational facilities plan1 for the school;
- Whether inspection of the condition of the physical features of the facility and evaluations of energy use and indoor environmental hazards at the school had been performed by qualified professionals within the last 5 years; and
- Whether various steps had been taken in the last 5 years to improve energy efficiency at the school.

NCES, in the Institute of Education Sciences, conducted this survey in spring 2013 using the Fast Response Survey System (FRSS). FRSS is a survey system designed to collect small amounts of issue-oriented data from a nationally representative sample of districts, schools, or teachers with minimal burden on respondents and within a relatively short period of time. The survey on the condition of public school facilities was mailed to the school districts of approximately 1,800 public schools in the 50 states and the District of Columbia. While individual schools were sampled, the questionnaires were mailed to the districts with which the schools were associated. A separate questionnaire was enclosed for each sampled school. The cover letter indicated that the survey was designed to be completed by district-level personnel who were very familiar with the school facilities in the district. Often this was a district facilities coordinator. The letter indicated that the respondent might want to consult with other district-level personnel or with school-level personnel, such as the principal of the sampled school, in answering some of the questions. Respondents were offered the option of completing the survey via the Web. The unweighted survey response rate was 90 percent and the weighted response rate using the initial base weights was also 90 percent. The survey weights were adjusted for questionnaire nonresponse and the data were then weighted to yield national estimates that represent all eligible public schools in the United States.

Because the purpose of this report is to introduce new NCES data from the survey through the presentation of tables containing descriptive information, only selected national findings are presented. These findings have been chosen to demonstrate the range of information available from the FRSS study rather than to discuss all of the data collected; they are not meant to emphasize any particular issue. Readers are cautioned not to make causal inferences about the data presented here. The findings are based on self-reported data from public schools and school districts. Many of the variables examined are related to one another, and complex interactions and relationships have not been explored.

Tables of standard error estimates are provided in appendix A. See the technical notes (appendix B) for detailed information about the survey methodology. Appendix B also includes definitions of the analysis variables (i.e., school characteristics) and rating scales and terms used in the report. The questionnaire is located in appendix C.

ADDRESSING DEFERRED MAINTENANCE TO IMPROVE K-12 FACILITY GRADES

The Gordian Group, 2015, www.thegodiangroup.com

Deferred maintenance issues don't pop up overnight, they typically bubble underneath the surface of public infrastructures and budgets for years. The cost of deferring repairs on a day to day scale is small, however as the minor costs compound the cost grows into a substantial expenditure on budgets. One problem turns into multiple major problems and in turn decays equipment or buildings to the point where there are serious fiscal and tangible consequences. Due to the expanded time horizons over which these issues are generated and addressed, school systems need an overarching construction procurement strategy to efficiently chip away at the backlogged repair and renovation demands that have long plagued their facilities.

Deferred maintenance is recognized as a common practice among by school districts that lack the necessary funds to address repair issues as they arise. It is easy for public schools to fall into a pattern, but at the end of the road there are expensive consequences. Not only are school districts sitting on top of unmet maintenance needs, but "aging school facilities mean that more institutions are actually failing to meet minimum acceptable standards on top of it."

76% of America's public schools need to spend money on repairs, renovations, or modernizations in order to elevate these schools into a good overall condition. In 2013, the U.S. Green Building Council's Center for Green Schools reported that it would cost $542 billion for U.S. schools to meet current education, safety, and health standards. How did that number get so high?

Strengthening School Operations. Report of the Working Group on School Operations.

February 29, 2012.The Report of the School Operations Working Group is the product of the Provincial Discussion Table agreements between school board associations and support worker unions. This report to the Deputy Minister of Education explores school boards' School Operations spending and Ministry funding in order to promote shared understanding, to identify areas where improvements can be made to School Operations-related activities and reporting, and to identify where further research is needed.

This report to the Deputy Minister of Education is the product of the analysis and discussion undertaken by the School Operations Working Group. The intent of the report is to provide consensus recommendations of the group regarding how to improve the operation of schools, as well as provide relevant analysis, research and discussions that informed those recommendations.

The report starts with key components of school operations – including funding and board practices. The report also provides key data and significant results from the analysis undertaken by the Working Group.

The recommendations that follow are consensus recommendations, representing if not unanimity, then a high-level of agreement between boards and unions.

A comprehensive learning space evaluation model

Lead institution Swinburne University of Technology Partner institutions Victoria University, the University of Queensland, Project leaders Nicolette Lee, Swinburne University of Technology, Dr Julie Dixon, Victoria University, Trish Andrews, the University of Queensland Project team Stella Tan Swinburne University of Technology, Daniel Tout, Victoria University, Lorrine du Toit, The University of Queensland.   Report authors Nicolette Lee Stella Tan. Final Report 2011. <http://www.swinburne.edu.au/spl/learningspacesproject/>

This document reports on the process and outcomes of the Australian Learning and Teaching Council (ALTC) funded project entitled 'A comprehensive learning space evaluation model'. Commencing in 2008, the project was carried out over a two year period by a project team based at three Australian universities: Swinburne University of Technology, Victoria University and The University of Queensland. The project team members were chosen for their collective expertise in education and evaluation, and for their leadership roles in campus development projects in their respective institutions. Each university also had an innovative space that was recently completed, creating an ideal partnership for the purposes of this project.

The project was designed as an investigation into the purposes, theory and practice of the evaluation of learning spaces in the university sector in Australia and beyond. There were three major strands of investigation. Firstly, a review of literature and practice in the evaluation of learning spaces, with a particular emphasis on the identification of models and methods in use, and the aims of those evaluations. To this end, we contacted over 100 institutions to ask for case-based examples of evaluations, and where available, the instruments that had been used. Secondly, the three institutional partners carried out trial evaluations of learning spaces. These evaluations covered three distinctive types of spaces, evaluation foci, and methods of investigation. Thirdly, an exploration of the degree of stakeholder ownership, and understanding of the evaluation of learning spaces. This last investigation was carried out through a series of structured interviews with stakeholders in each of the partner institutions. Findings from each of these strands of investigation were published on the project website (www.swinburne.edu.au/spl/learningspacesproject/). Findings showed that institutions share a range of challenges in relation to learning space design and evaluation. Specifically: a lack of resourcing dedicated to comprehensive evaluations; sensitivity of evaluation processes and findings; a tendency to present spaces positively and without contextual information; limitations in understanding about the purpose and value of evaluation; limiting assumptions about the potential for input from a variety of stakeholders, and; the complex nature of evaluation itself. Further challenges to the sector arise from the lack of maturity in the field. In particular the lack of longitudinal and comparative research regarding the impact of campus design on learning and teaching practice. Advances in the proxies for student learning are required, as are more grounded studies identifying the relationship between spaces and behavior.

Over the period of the project, it became clear that these concerns are shared across the sector, and that there are a number of groups working within institutions with these challenges in mind. We have also seen significant changes in thinking and a broadening of understanding of the nature of evaluation, including increasing concern with developing meaningful evaluation processes. This is likely, providing resourcing constraints are resolved, to result in improved rigour and reporting of evaluation processes and outcomes over the coming years.

Improving the quality of school facilities through building performance assessment

Educational reform and school building quality in Sa˜o Paulo, Brazil Sheila Walbe Ornstein, Nanci Saraiva Moreira, Rosaria Ono, Ana J.G. Limongi Franc¸a and Roselene A.M.F. Nogueira. www.emeraldinsight.com/0957-8234.htm

Purpose – The paper describes the purpose of and strategies for conducting post-occupancy evaluations (POEs) as a method for assessing school building performance. Set within the larger context of global efforts to develop and apply common indicators of school building quality, the authors describe research conducted within the newest generation of Sa˜o Paulo's schools.

Design/methodology/approach – The various methods of POE, including expert walkthroughs, physical measurements, observations, behavioral mapping, user interviews, focus groups, and survey questionnaires were applied within a purposefully selected case study school.

Findings – The POE carried out at Fernando Gasparian High School revealed limitations in the building's design, particularly in light of the neighborhood context, thus raising significant concerns about safety and security. Users gave the construction quality of the building, a generally positive evaluation, however, there were some important aspects of the building design judged as deficient. In particular, researchers observed a significant mismatch between the building design and the realities of the surrounding community. This sort of incongruity introduced important challenges to principals, teachers, and staff, as they worked to ensure the safety of students who attend the school.

Originality/value – The research explores the effectiveness of POE methods in capturing user and expert assessments of overall building quality, as well as the degree to which building designs assist educators and community members in realizing Brazil's larger educational reform goals.

Public School   Capital Improvement Programs - Basic Elements and Best Practices:

GUIDANCE FOR THE DISTRICT OF COLUMBIA. Prepared for The World Bank Group. July, 1999. The Scientex Corporation. The 21st Century School Fund.

The District of Columbia is currently planning a comprehensive initiative to build new schools and modernize existing school facilities. To generate and sustain the requisite level of public support, that initiative—the first in 30 years—requires the development of a well-managed capital program. Additionally, a program of such magnitude must be guided by best practices of the public and private sectors and must include educational and community requirements in planning and designing school buildings.

The major objective of this report is to provide decision-makers in the District with information to assist them in evaluating options for effective and efficient management of a capital improvement program for public school facilities. Such a program must support equity in the allocation of resources and be able to deliver educationally appropriate, modern school buildings effectively and cost-efficiently. Supporting objectives of this report are as follows:

- to identify and describe basic elements of a well-managed school construction and modernization program,

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- to discuss strategies used by other school districts in the application of the basic elements of a well-managed construction and modernization program,
- to review capital program management options used by other school systems and the private sector,
- to provide an historical context for understanding the management of school construction in the District,
- to analyze implications of the findings of this review, and
- to recommend immediate steps towards developing a well-managed capital program in the District.

FACILITY MANAGEMENT SCHEMES FOR SCHOOLS IN THE UK: A STUDY OF VARIATIONS IN SUPPORT SERVICES COSTS AND CAPITAL EFFICIENCY RATIOS

By Rui PedroPereira Magalhaes 1 September 2013. A Dissertation submitted in part fulfilment of the Degree of Master of Science Built Environment: Facility and Environment Management, Bartlett school of Graduate Studies University College Londo

Purpose – Literature relating to the building services industry affirms that Operational costs in Buildings are associated with the initial capital investment, in a way that, if the operational life cycle is considered when evaluating the design and finance it will lead to better performance and fewer operational costs. Facility Managers do contribute strategically to these projects in a DBFO system such as PFI. Some recent UK schools have been made by the PFI and the object of this research is to demonstrate it is a fact that operational costs for these early planned schemes are lower than the conventionally funded school facilities.

Design/Methodology/Approach – 10 PFI and 10 non PFI UK Schools were studied in terms of operational costs per student comparison (years 2002 to 2010).   Capital costs from the respective 10 PFI projects were also obtained in order to assess the hypothesis that higher capital investment leads to lower operational costs.

Findings – The results show that PFI Schools are not necessarily less expensive to run, but however demonstrate a decreasing trend. The conventionally funded schools although showing lower operational expensive in averages they suggest a contrary increasing trend in operational costs. The Bathtub phenomenon may explain why PFI schools are having unexpected early adjustment costs and why conventionally funded schools are showing rising operational costs

Practical Implications – To achieve a better comprehension of lifecycle operational cost assessments and to understand what drives the costs to change from one building to another with the same function and characteristics. It would give advice on investment and contract arrangement decisions in what relates with FM (Facility Management) in public buildings, schools in this case.

Current and Future M&R Funding Needs for a Historic School

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Decisions about the economic viability of a 100-year old school in Delaware depended on accurate estimates of current and future M&R funding requirements. Current M&R requirements were estimated with a conventional facility assessment, and also estimated using the Whitestone MARS life-cycle cost model. The difference between the two estimates was less than 10 percent, demonstrating that a lifecycle model can be a cost-effective alternative to physical inspection for estimating deferred maintenance. The same model showed that future M&R costs for the historic school would average almost 40% higher than those of a new school.

A Report and Estimating Tool for K-12 School Districts - Why Total Cost of Ownership (TCO) Matters

April 2003 Engagement: 220384931. For internal use of K-12 School Districts only. Entire contents © 2003 Gartner, Inc. April 2003

Technology is an increasingly essential K-12 resource. As budgets tighten, however, districts are coming under pressure to articulate the costs and benefits of existing and planned technology expenditures. Increasingly, educational policy makers are seeking evidence that their highly visible investments in technology are meeting educational needs and that these information technology (IT) investments are closely monitored and well-managed.

Because of these issues, adoption of total cost of ownership (TCO) and return on investment (ROI) tools to measure the cost and effectiveness of technology initiatives are becoming more common. Gartner, a leading information technology research firm, defines Total Cost of Ownership (TCO) as a comprehensive set of methodologies, models and tools to help organizations better measure and manage their IT investments.

For more than 15 years, Gartner has counseled its business community clients to consider all costs associated with computing when making management decisions about computer acquisitions, upgrades, support and administration. As enterprises have begun to address the significant and rising costs devoted to computing infrastructure, the message has gained wide acceptance among technology users.

Since the start of its K-12 TCO initiative five years ago, "Taking TCO to the Classroom" (www.classroomtco.org), the Consortium for School Networking (CoSN) has been widely recognized for helping school technology leaders understand how to budget to operate their growing

networks of computers and other devices in a cost-effective way. CoSN has worked to develop tools and resources to help ensure that school leaders budget adequately to support their technology.

True acceptance and application of the TCO concept, however, is just emerging in the K-12 community. There are several reasons for this. Schools have been late adopters of desktop technology; however, the level of investment has increased to the point where it is clearly "on the radar". Traditional TCO models have been complex, and school districts (and other educational institutions) have lacked the resources to use them. TCO models have also been built primarily for corporate and larger public and non-profit organizations. The metrics they have produced have not been geared to the K-12 community. Finally, since there has been no critical mass of K-12 participation in TCO initiatives, there has been little comparative data available.

In response to this need, Gartner and CoSN, with support from the North Central Regional Technology in Education Consortium (NCRTEC) operated by the North Central Regional Education Laboratory (NCREL), and the U.S. Department of Education, initiated a project to generate interest and adoption of Total Cost of Ownership concepts in the K-12 environment.

Essential to this undertaking is the simple concept of objectivity that guides this work. Therefore, the TCO methodology favors no single technology product, supplier, group of suppliers, or computing architecture, but provides organizations with a credible means of evaluating options to intelligently reduce overall technology costs.

Estimates of Unscheduled Facility Maintenance

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Unscheduled maintenance is poorly understood despite its considerable claim on the facility operating budget. Survey results from a sample of fifteen facilities indicated that unscheduled maintenance absorbed an average 44 percent of the overall facility M&R labor requirement. The percentage of unscheduled maintenance varied by building system, with conveyance systems requiring the least (21 percent) and plumbing the most (63 percent). Results of the survey can be used to refine asset management and budget planning tools.