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AUTHOR Lackney, Jeffery A.
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ABSTRACT

Over the past decade, thousands of new school buildings and renovations have been planned, designed, and constructed in the United States. Of these, only a small fraction will ever be evaluated against the educational needs of students and teachers. This paper reflects on the state of post-occupancy evaluation (POE) in the practice of educational facility design in the United States within the context of the "School Construction News/Design Share Awards 2000" program. This program openly invited submissions while encouraging, but not requiring, a post-occupancy evaluation be conducted on a newly designed and occupied facility. One of the objectives of the program is to encourage and publicize nationally the value of conducting POEs. Three POEs received honor, merit, and citation awards: Davidson Elementary School in Davidson, North Carolina; Central Tree Middle School in Rutland, Massachusetts; and Indian Trail Elementary School in Canal Winchester, Ohio. The paper provides a description and a comparative analysis of the methods used in each POE, a summary of jury comments, and recommendations for the refinement of the awards program in promoting the POE. (Appendices contain a question form for conducting a POE, and a list of the 2000 jury members. (Contains 17 references.) (Author/EV)

The State of Post-Occupancy Evaluation in the Practice of Educational Design

Jeffery A. Lackney, Ph.D., A.I.A.
School Design Research Studio
University of Wisconsin-Madison

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Over the past decade thousands of new school buildings and renovations have been planned, designed and constructed in the U.S. Of these only a small fraction will ever be evaluated against the educational needs of students and teachers. This paper reflects on the state of post-occupancy evaluation (POE) in the practice of educational facility design in the U.S. within the context of the School Construction News and Design Share Awards 2000 program. This program, openly invited submissions while encouraging, but not requiring a post-occupancy evaluation be conducted on a newly designed and occupied facility. One of the objectives of the program is to encourage and publicize nationally the value of conducting POEs. Three POEs received honor, merit and citation awards, Davidson Elementary School in Davidson, North Carolina, Central Tree Middle School in Rutland, Massachusetts, and Indian Trail Elementary School in Canal Winchester, Ohio. The paper provides a description and a comparative analysis of the methods used in each POE, a summary of jury comments, and recommendations for the refinement of the awards program in promoting the POE.

Post-Occupancy Evaluation of School Facilities

Post-occupancy evaluation of school buildings and educational environments has nearly a forty-year history. The Building Performance Research Unit (BPRU) at the University of Strathclyde appraising over fifty comprehensive schools in Scotland in the late 1960s (BPRU, 1972) provides one of the seminal examples of the post-occupancy evaluation of school buildings. Techniques that related space and its organization to people's responses, space use, costs, services and movement were developed.

In the United States, Rabinowitz (1975) reported on a diagnostic post-occupancy evaluation conducted in four schools in Columbus, Indiana that looked comprehensively at technical, functional and behavioral aspects of each school. Data collected through observation, photography and surveys was compared to existing standards (see Prieser, Rabinowitz & White, 1988; 138-151).

In an effort to standardize the evaluation of educational facilities, a guide was first developed by the Council of Educational Facility Planners International (CEFPI) in 1986 (Hawkins & Lilley, 1998) that provides evaluative criteria for school administrators and community leaders to measure the quality of a school facility for general condition and suitability for education. Over 125 items affecting the functioning of school buildings are offered in six areas: the school site, structural and mechanical features, plant maintainability, school building safety and security, educational adequacy and environment for learning. Non-technical language was developed in the three instruments (elementary, middle and secondary school instruments) to enable educators and community leaders in addition to technical experts would be able to conduct an appraisal. The stated purpose of the appraisal includes the performance of a post-occupancy evaluation, the formulate a permanent record to document deterioration, to highlight specific appraisal needs, examine the need for new facilities or to evaluate the need for renovation, as well as to serve as an instructional tool.

Sanoff (1994) presents a series of school design and evaluation case studies conducted over several decades of practice in North Carolina and elsewhere that illustrate the use of a set of assessment tools for evaluating learning environments. Most recently, the National Clearinghouse for Educational Facilities has sponsored a manual on school building assessment methods (Sanoff, 2000) (available free at www.edfacilities.org) that provides a series of school building rating scales for evaluating the school building as a whole, informal social space, dining space, classroom environments, classroom arrangement, indoor and outdoor learning spaces.

Building Condition Assessment and Educational Adequacy

Post-occupancy evaluation (POE) is generally defined as the process of systematically evaluating the degree to which occupied buildings meet user needs and organizational goals. The POE provides "an appraisal of the degree to which a designed setting satisfies and supports explicit and implicit human needs and values of those for whom a building is designed" (Friedmann et al, 1978; 20).

Within the context of school facilities, post-occupancy evaluation is most concerned with the degree to which the building supports the goals of the educational process by measuring the physical environment's educational adequacy (Hawkins & Lilley, 1998).

Zimring and Rosenheck (2001) summarize a number of potential benefits of POE in educational design practice:

- Aids communications among stakeholders such as designers, clients, end-users and others;
- Creates mechanisms for quality monitoring, similar to using student testing to identify under-performing schools, where decision-makers are notified when a building does not reach a given standard;

- Supports fine-tuning, settling-in and renovation of existing settings;
- Provides data that informs specific future decisions;
- Supports the improvement of building delivery and facility management processes;
- Supports development of policy as reflected in design and planning guides;
- Accelerates organizational learning by allowing decision-makers to build on successes and not repeat failures.

The most common form of building assessment in public school systems is that of the building condition assessment which most often conducted at the school district administrative level to determine the scope of capital outlay programs. Building condition assessments are expert-driven processes that look primarily at observable conditions of the physical structure and building systems. There is an implied relationship between building condition assessments and educational quality in that administrators may assume a poor physical environment will eventually impact the learning process. However, building condition assessments do not explicitly address educational adequacy of the school building, that is the relationship between physical condition of the school and various educational goals and activities that take place within the building. The purpose of these assessments is generally not to improve the educational process, rather it is to create a political rationale and technical physical improvements schedule for spending capital improvement funds to reverse the deteriorating effects of deferred maintenance.

Educational adequacy is defined as the degree to which a school's facilities adequately support educational goals and activities. It is this form of assessment that comes closest to traditional post-occupancy evaluation methodology that emphasizes user need, experience and value. Educational adequacy assessment is an overlooked element in many school districts preparing to improve and modernize aging facilities for new educational programs and information technology.

The POE and Educational Design Practice

Empirical evidence that the POE in the practice of educational design is scarce, but not completely absent. Trade journals have published articles on the importance and value of post-occupancy evaluation after one year of occupancy (Jackson; October, 1997). CEFPI's Educational Facility Planner Journal, routinely publish completed post-occupancy evaluations of schools (Pitillo, 1993 being one example). For the most part, however, systematic post-occupancy evaluations that look at issues of educational adequacy to expressly improve the on-going educational process play a limited role in educational design practice. If POE

methodology is used at all, it is to conduct cursory facility assessments to determine facility needs for new construction or renovation projects.

From a review of the published print and Internet-based literature conducted by this author, the majority of post-occupancy evaluations that have been conducted beginning in the 1960s have been partnerships between academic institutions, design practitioners and school districts. A few examples in the United States alone include: The University of Wisconsin-Milwaukee (Rabinowitz, 1975; Rabinowitz and Weisman, 1987; Lackney, 1996); The University of Cincinnati (Preiser, Rabinowitz & White, 1988); University of Washington's Center for Architecture and Education (Bassetti Architects, 1994); University of North Carolina-Charolette (Pitillo, 1993); North Carolina State University (Sanoff, 1984); Georgia Institute of Technology (Zimring & Rosenheck, 2001); and the University of Minnesota. Many other examples exist of post-occupancy evaluations conducted by university researchers in schools of architecture and engineering.

Despite the appearance of activity of various academic centers around the U.S. and the world in conducting POEs, it is generally assumed that the POE is "widely acknowledged but rarely practiced" (Doidge, 2001). A recent survey of newly qualified architects in the UK identified POE as one of the topics for which they felt least prepared (Doidge, 2001). A cursory search of the Internet by the author indicated a dozen or more architectural firms in the U.S., U.K. and Australia that market post-occupancy evaluation services. No survey has ever been done to indicate to what degree these firms are contracted to conduct POEs in their practice, but there is some indication of the intent to institutionalize the POE in practice.

The greatest obstacle to POE studies is that professionals must guard their reputation and avoid litigation (Doidge, 2001). Other obstacles include the lack of integration of POE methodology with professional architectural design services, and no clear economic incentive for conducting the POE in the first place. Client organizations are not quick support the POE due to the potential for bad publicity if problems are uncovered so soon after a large expenditure of public funds.

An earlier review of the impact of the POE on the wider context of design practice revealed similar conclusions (Shibley, 1985). Shibley (1985) argues that if POEs are to influence design, researchers must respond effectively to the complexity of the building process if they hope to influence the quality of the built environment in any substantial manner. Mechanisms for insuring that programmatic and evaluative information are used effectively in the process of design and facility management decision-making are typically not in place thereby devaluing the potential impact of the POE. Early in the development of building evaluation, Brill (1974) had warned that evaluation of solutions without reference to the design process that generated them was a "dead end". He argued that subjective evaluations of many researchers would be of little value because they were "essentially unhinged from the design process" (p.317). Although this is generally the case today, there are new initiatives that may make

some progress toward integrating POE methodology with educational design practice.

Recent Models of POE in Practice

The application of the POE in the practice of educational design has evolved from the single-site evaluation to systematic multi-site evaluation programs in larger school districts. The older and more common model of a single-site evaluation conducted by a reflective practitioner as part of an additional service, or the university researcher as part of a larger research program have not proved to be sustainable.

Two general models serve to illustrate the form that POEs are taking on in the practice of educational design: outsourcing the POE to a professional consultant, and institutionalizing the POE within the school district organization.

Outsourcing Facility Assessment Consulting Services

The first example illustrates the role of the facility assessment consultant in large urban school districts. Magellan K12 (http://www.magellan-k12.com) is a consulting firm specializing in building condition assessment and educational adequacy of school facilities. For example, they are, or have conducted educational adequacy assessments in the:

- Cleveland Municipal School District to use in planning the implementation of a ten-year modernization program for their 122 schools. The result of the study will ensure CMSD has the knowledge base and credibility to manage a construction and renovation effort in excess of $1 billion, as well as secure matching funds from available state financing mechanisms for approximately two-thirds of the anticipated capital cost.
- Orange County Public Schools, performed assessment for 96 elementary schools, 24 middle schools, 6 ninth grade centers, 15 high schools and 4 technical centers, identifying $285 million in physical deficiencies and program requirements necessary to bring OCPS schools into compliance with educational adequacy standards.
- Houston Independent School District has instituted the Facility Assessment Program that completed the assessment of the entire district, facilitated district-wide standards development, collected 11,000 completed questionnaires regarding educational facilities from principal and teacher, conducted a detailed space inventory, initiated a community outreach program, and provided funding scenarios for successful $700 million bond referendum.

Institutionalizing the POE in the School District Facility Operations and Management

Proposals to advocate for the institutionalization of the POE (Zimring, 1988) within the normal operations of the organization are now becoming more evident in practice. The driving motivation and purpose for these facility assessments have been the need to create databases from which to make capital improvement decisions. Two case studies serve to illustrate this emerging practice.

The New York City School Construction Authority (SCA) provides the first example of this form of assessment (Zimring & Rosenheck, 2001). A lessons-learned program initiated in 1997 for New York City to examine the success of school projects in the state was aimed at participation by consultants To get the program approved SCA required the architect/engineer of record to conduct the POE. The rationale was that this would guarantee that designers would confront how users responded to their designs, and force a lessons-learned loop in the design process. About twenty POEs have been completed. To ensure reliability, SCA reviewed the results before approving the POEs. In some cases, the architects or engineers had to re-schedule their interviews when they were suspected of introducing a bias, or continue their investigation if they failed to include critical areas required in the study.

The second example illustrates the role of the state in setting policy that has the potential of institutionalizing the POE in the practice of educational design. The state of California has begun a Department of General Services POE Program, http://www.poe.dgs.ca.gov/, (Zimring, C. and Rosenheck, T. 2001).

As stated on the California DGS POE website:

> "The goal of this program is to improve DGS buildings, DGS and State building delivery processes, the responsiveness of DGS to customers and perception of DGS service by customers. It will incorporate a flexible, efficient evaluation process into the daily activities of the DGS. It will support all stages of the building delivery system such as the Five-Year Plan, facilities plans, Capital Outlay Budget Change Proposals, Budget Packages, design, construction and operations.
>
> Major focuses of the program will be to better understand the impact of early design delivery decisions on long term efficiency and effectiveness of buildings and to better understand the impact of building delivery processes and decisions on customer response both initially and over the life cycle of the building. It will be broadly inclusive both within and outside DGS, partnering with customers as appropriate. It will start quickly and modestly and will include ongoing development and refinement."

These two models form the basis for the future development of the post-occupancy evaluation in educational design. One from the client side, the other from the private consultant side. The conduct of POEs by architectural and

engineering firms as single-shot cases is far less common and not likely to evolve without the client, public or private sector, driving the need.

THE SCHOOL CONSTRUCTION NEWS/DESIGN SHARE AWARDS 2000 PROGRAM

In an effort to advocate for innovative approaches to the creation of effective learning environments, Designshare, Inc and School Construction News partnered in 1999 to form the SCN/DS Awards 2000 Program. One objective of the awards program was to us a well-publicized design competition as an innovative way of introducing the concept of post-occupancy evaluation as an integral stage in the design and construction process (Lackney; September, 2000). The intention was to award citations to school design projects based in part on a criterion of user satisfaction along with other more traditional criteria.

The School Construction News/Design Share Awards 2000 Program focused less on aesthetics and more on the creation of effective learning environments, making it unique among awards programs that traditionally recognize outstanding design. The jurors rewarded schools that demonstrate thoughtful and rigorous evaluation of educational facility planning, management, and use. They looked for innovative design solutions that responded to current educational reforms, including small schools, learning communities, urban community schools, and charter schools.

Also making this award program unusual is the jury system itself. In contrast to traditional awards program in which projects are collected, a jury convened, and winners selected, the Awards 2000 jurors evaluated the projects over the Internet. The online format allowed us to easily convene a large and diverse group of jurors from around the world (see Appendix B)—all of whom discussed and evaluated the thirty-three project submissions during a two-week review period. The majority of submissions were received digitally and posted on a private Design Share link. Many of the jurors felt the online format demanded more of their attention, encouraging more in-depth deliberation than is usual in an awards program.

Awards Program Criteria: School as Centers of Community Design Principles

Criteria for evaluating submissions was based on the six design principles developed by the US Department of Education (see http://www.ed.gov/inits/construction/ctty-centers.html and http://www.edfacilities.org/ir/edprinciples.html) — principles endorsed by the American Institute of Architects (AIA), the Council for Educational Facilities Planners International (CEFPI), Urban Educational Facilities for the Twenty-first Century (UEF21), and the American Association of Retired Persons (AARP).

The design principles are predicated on three conditions; that learning is a lifelong process, design is always evolving, and resources are limited. Learning environments should be designed to:

1: Enhance Teaching and Learning and Accommodate the Needs of All Learners

- Follow the research in the learning sciences
- Students doing rather than just receiving
- Students creating rather than re-creating
- Students solving problems
- Cooperative, project based, interdisciplinary learning
- Emphasis on learning styles, multiple intelligences and the special needs of each student
- School buildings are important tools for learning
- Accelerate research on the impact of the physical environment on student achievement

2: Serve as a Center of Community

- Encourage community use after hours, late at night and on weekends
- Serve as centers of lifelong learning and training
- Serve leisure, recreational, wellness needs of the community
- Facilitate public access to communications technology
- Facilitate parent and community involvement
- Support professionalism and participation of staff members
- Reflect the noble character of public architecture

3: Result from a Planning process Involving all Stakeholders

- Include educators
- Include parents
- Include students
- Include community stakeholder
- Respect differences in age, culture and gender
- Allow adequate time and resources for the planning process

4: Provide for Health, Safety and Security

- Attractively designed and well maintained facilities
- Appropriate school and classroom populations
- Address all safety and environmental codes
- Maintain healthy indoor environments

- Minimize obscured or poorly lit places
- Carefully designed traffic patterns

5: Make Effective Use of All Available Resources

- Maximize the impact of the physical environment on learning
- Building and landscape should serve as "three dimensional textbooks"
- Maximize the use of community resources
- Encourage learning/workplace interface
- Re-use existing facilities to preserve natural and historic environments
- Maximize the benefits of cultural diversity
- Maximize the use of energy resources
- Provide for the extensive use of technology
- Design within limits that can be maintained by future generations

6. Allow for Flexibility and Adaptability of Changing Needs

- Allow for what we do not yet know
- Flexible design and adaptable systems
- Evaluate master plans and educational
- specifications at least every five years
- Plan for the rapid expansion of technology

Each submittal was required to answer the following questions derived from the Department of Education principles:

1. How was the project designed to enhance effective learning and teaching? How have the people who learn and live in these spaces interacted with their environment? (Enhance Teaching and Learning and Accommodate the Needs of All Learners)
2. How was the project planned/designed to reinforce the school as a center of the community? (Serve as a Center of Community)
3. Describe the planning/design process and who was involved (Result from a Planning process Involving all Stakeholders)
4. How was the project designed to provide for comfort and health, safety and security? (Provide for Health, Safety and Security)

5. What design strategies were employed to enhance the use of all available resources? (Make Effective Use of All Available Resources)
6. What design strategies were employed to address changing educational needs over time? (Allow for Flexibility and Adaptability of Changing Needs)

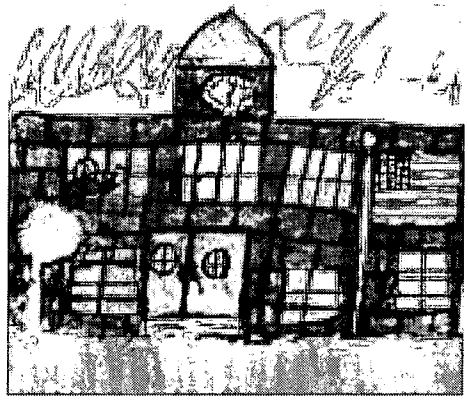
RESULTS AND FINDINGS

Of the thirty-three submissions, twenty-six received an award in a range of categories. This paper reports on the three POE (Post Occupancy Evaluation) winners. A complete list of awards is featured at www.designshare.com.

Jurors considered POEs the most significant aspect of this program. POEs determine the success of a building by evaluating how the facility is functioning, how teachers and students are utilizing the space, and how the educational process has changed as a result of the design—not in theory, but in reality. Evaluations improve educational architecture. Of the thirty entrants, only eight submitted a POE. The jury attributed this result to a lack of experience in conducting the evaluations and the time and money they require. Many other projects had not been occupied long enough a post-occupancy to be performed, while clearly others ignored the optional requirement.

The jurors felt the following three projects contributed to the practice of post-occupancy evaluation in educational design: Davidson Elementary School in Davidson, North Carolina, Central Tree Middle School in Rutland, Massachusetts, and Indian Trail Elementary School in Canal Winchester, Ohio.

POE Honor Award : Davidson Elementary School, Davidson, NC



Architect:
Adams Group Architects, PA
Graham Adams, Jr., AIA, President
10020 Park Cedar Drive, Charlotte, North Carolina 28210
(704) 341-0303
adamsgrp@theadamsgroup.com http://www.theadamsgroup.com

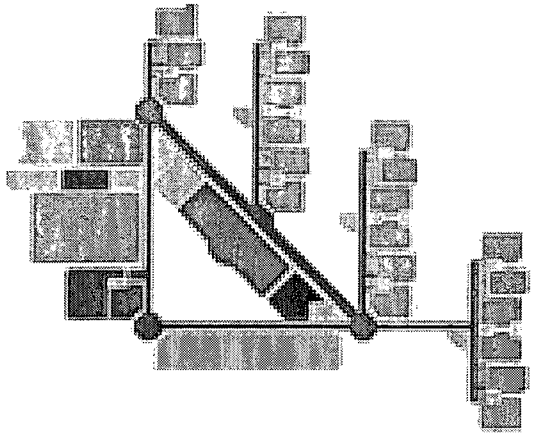
Planning Partner:
Henry Sanoff, AIA
Professor of Architecture
North Carolina State University, Raleigh, NC 27695-7701
(919) 515-2205 henry_sanoff@ncsu.edu

Owner: Charlotte Mecklenburg Schools

Contractor: Edison Ford, General Contractors, Charlotte, North Carolina

Key Consultants:
- Mechanical: Professional Engineering Associates, Charlotte
- Electrical: Haas and Kennedy Engineers, Charlotte
- Structural: Structural Engineering Associates, Charlotte

• Civil: West Engineering, Charlotte



Planning Principles

1. How does the project enhance learning (and teaching), and support the needs of all learners?

The project is designed to support learning in a number of ways. Some of them include:

The interior classroom design is developed using learning centers arranged as a house group of 6 classrooms. Each classroom allows the teacher to form development appropriate areas for learning activities. The corridors are arranged so that no more than 6 rooms are located on a single loaded corridor. By offsetting the center classrooms, the wider corridor provides an additional shared learning center for use by the classroom group. By reducing the traffic pattern associated with each house, the shared areas are developed in unique ways as specified within each teaching group. Some of these areas utilize a couch and soft furniture for reading areas. Others form table and display areas for group activities.

2. How does the design reinforce the school as a center of the community?

Community groups were involved in the design of the school. This included working with local artists, who contributed their time each week to tutor at the school. The artists expressed a desire to have places to exhibit student work as well as art developed by the local community. As a result of this desire, a gallery space was provided in the school design. The gallery allows for permanent artwork, designed and installed by the students working with local artist, as well as areas for temporary art display.

In addition, the community working through the PTA expressed a desire to have a full sized gymnasium. An unusual feature for elementary schools in the region, a gym area was developed in exchange for code-required road improvements provided by the Town of Davidson. The gym area provides a community center for the public and a recreation area for the school. This facility is utilized throughout the day and year.

3. Describe the planning/design process and who was involved.

The planning and design process for the school was very participatory. The involvement included all students and teachers at the school, school administration representatives, parents and PTA members, Town of Davidson Council and Historic Appearance Commission members. A specific participatory method was developed and utilized for each group.

The teachers and school administration participated in a design game where they developed alternative site concepts and room arrangements for the proposed school using materials developed by the architects and consultant Henry Sanoff.

The students were engaged in developing a wish poem, a series of statements beginning with the phrase "I wish my school _____". These statements were combined with dream drawings the students completed for the image of the new school. One of the images was used to create the final elevations for the school by the architect.

Town Council and Historic Appearance Commission participated in the editing of computer generated images presented by the architects of the school project shown in neighborhood context. By participating with the architects, this group was able to communicate desires for the building color, finishes, building massing and site details for the project.

4. How does the project provide for health, safety and security, beyond standard approaches?

The project is designed to allow for natural ventilation in support of day-lighting features. The development of fresh air concepts reduce the sick building syndrome exhibited in many schools were ventilation issues are a problem.

5. How does the project enhance the use of all available resources?

The 20-acre site design reserved 11 acres as a natural preserve. This compact utilization of the building site represents a sensitive response to preserving natural resources and animal habitats.

Within the remaining 9-acre building, parking and outdoor play areas, the design takes advantage of southern sun exposures to enhance outdoor learning

activities. Each classroom has an outdoor learning area for creating art and science projects as well as supporting classroom activities.

6. What unique strategies allow for flexibility and adaptability to changing needs?

The classroom design allows for flexibility in team teaching and multi-grade curriculum tasking. By locating K-1 classrooms in each wing, the school plan affords the opportunity to develop alternative curriculum approaches. This feature along with the learning center approach to classroom design allows for flexibility.

Program Summary:

The Participatory process engaged students, staff, school community and parents in a variety of interviews and workshops. The participants were arranged into small discussion groups. Within these groups the individuals were asked to discuss their needs and requirements for an ideal school. Teachers were divided into small groups based on their teaching focus. The participants selected statements from a pre-arranged list, with statements such as developing communication skills, developing initiative and spontaneity and developing social awareness. Participants were asked to make their decisions based on group consensus to insure that the process could move forward. There was a strong support for the school's interaction with the Davidson Community. Developing a sense of community was an important issue for the teachers.

The next part of the session consisted of photographs providing examples of different environments. This interaction allowed teachers to visualize how the physical environment can support their teaching methods, and this process encouraged intense discussion about the pros and con's of each. The photographs described a variety of outdoor settings that sparked interest for the need for a more integrated indoor-outdoor environment for learning.

After realizing the value of outdoor spaces, further discussion evolved and it was determined that the space could be used for different activities such as, small or large group activities, reading, art, eating and gardening. Outdoor areas were then added to the building design in the form of areas adjacent to each classroom, covered porches, and a variety of different courtyard spaces.

Children were also involved in the brainstorming sessions. Through an art exercise, students were asked to draw their dream school. Images such as cupolas, clocks and various window shapes were presented in the drawings. It became apparent that the students desired daylight throughout the building.

Another activity conducted by the design team was to have the teachers, parents and students complete a wish poem stating their desires for a new school. All involved were asked to complete the phrase, "I wish my school...". From this exercise a wish list was compiled.

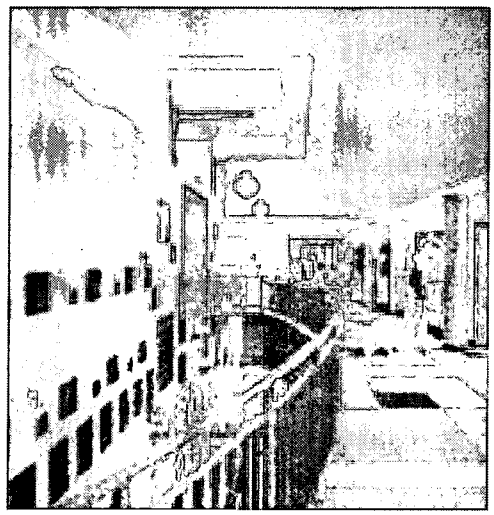
The final workshop was held to establish the site planning where participants were given a drawing of the new site and scaled building components

representing the spaces in the school building. The groups were asked to position the components where they felt would be the ideal location. At the completion of the session, each team presented their ideas for discussion and debate.

When all of the sessions were complete the information was compiled and the design team went to work developing the plans for the school. The design contains features that are not typical of traditional schools in the area; for example, K-1-2, and 3-4-5 were clustered together to allow for team teaching, single loaded corridors with classrooms oriented toward the south, and outdoor learning areas for each classroom. In addition the design features enlarged corridors flanking classroom wings which create special places for small groups. Nature courtyards, formed by the classroom wings are apparent throughout design. The natural part of the site with large trees and a stream were preserved for nature studies. The central courtyard also provides amphitheater seats and a stage for outdoor performances.

The day lighting concept developed for the project includes providing a light shelf. The purpose of the light shelf was to reflect natural light throughout the classroom area as shown in the diagram. This indirect light supplements the artificial lighting system typically provided in school facilities and reduced energy consumption. The translucent porch canopy also allows natural light to enter the classroom while providing necessary shading for the outdoor learning areas.

POE Merit Award : Central Tree Middle School, Rutland, MA



Architect:

HMFH Architects, Inc.

130 Bishop Allen Drive, Cambridge, MA 02139

Principal-in-Charge: Steven Friedlaender, AIA

Educational Planner: Laura Wernick, 617-492-2200, wernick@hmfh.com

Contact: Susan Elmore, Marketing Manager, 617-492-2200, elmore@hmfh.com | http://www.hmfh.com

School Contact:

Central Tree Middle School

285 Main Street, Rutland, MA

Alfred Tutela, Superintendent of Schools

Contact: Jim Purington, Building Committee Chair, 508-886-2386

Site Development Cost: $1,680,000

Fixed Equipment Cost: $252,370

Associate Firms:

Construction Manager: Fontaine Brothers, Inc.

Mechanical: TMP Consulting Engineers, Boston, MA

Structural: Foley & Buhl, Watertown, MA

Photography: Wayne Soverns, Jr.

Planning Principles:

1.How does the project enhance learning (and teaching), and support the needs of all learners?

The three primary ways in which the building was found to matter most—that is, support and in some cases, enhance the delivery of the middle school curriculum were:

Scale. The scale of the building was important in a number of ways including the fact that by being relatively compact, the school provides a comfortable transition between elementary and high school. Additionally, administrators and teachers reported that when the facility is more compact(as compared with their previous school) it is more supervisable.

Physical Organization. The most important way the physical organization of the building was found to support pedagogical goals was through the layout of classroom clusters. These provide a homebase for the students, corridors which are supervisable, and become social and academic extensions of the classroom space. Increased contact—both formal and informal—between teachers enables them to team teach and provide interdisciplinary instruction.

Physical Appearance. They physical appearance of the building was found to make a significant contribution to the users' experienced of the building. Both teachers and students reported feeling that the colorful atmosphere affected their mood, made the students feel that the building was designed for them and made the building seem "kid-friendly." Many design feature were seen as "fun" and the building overall was seen as appearing "important." The massing and use of special elements such as canopies, dormers, and round windows, help to diminish the possibility of the school seeming "institutional," and make the building more welcoming.

2. How does the design reinforce the school as a center of the community?

The building was designed to be inviting to all members of the community. At Central Tree, parents are first greeted by a series of bright blue banners hung from street lamps in the parking lot declaring the school's goals: R.E.A.C.H. for Excellence. The building has a strong, but friendly exterior presence. Upon entering the building parents are received in an open reception area. Chairs and a table provide a place to sit and feel welcome. Additionally, attractive conference rooms in which teachers, parents, and students meet also make the point that parental involvement is important to the school's philosophy. As a sixth grade teacher said: *"The main entrance to the building is visitor-friendly."*

3. Describe the planning/design process and who was involved.

The planning process initially involved the architects working with the Superintendent, administrators and staff to develop a series of basic design Principles. These Principles evolved from a strong sense on the part of the educators of what was needed to support a middle school program and what worked and did not work within the District's other middle school.

A Building Committee made up of parents, educators and community members was established. The architect presented a series of alternative approaches to achieving the Principles to the Building Committee. The Building Committee developed and approved detailed decisions based on how those decisions might impact the Principles.

4. How does the project provide for health, safety and security, beyond standard approaches?

Passive security measures were designed into every aspect of the building. The layout of the building is designed to assure complete visibility of all student access areas at all times. Administrative functions are divided up on both floors to assure administrators in addition to teachers, are available to supervise students.

Each grade level is formed into a cluster or "neighborhood". Teachers within each cluster can easily supervise all the students within any area of their cluster. Location of interior windows and locker lay outs reinforce the design intent.

5. How does the project enhance the use of all available resources?

There was a serious need within the community for recreational fields and for public access outdoor space. The school was landlocked and was very restricted by adjacent topography and wetlands. A single crossing of the wetlands was allowed to grant access to the site. The wetlands disturbance was mitigated adjacent to the crossing.

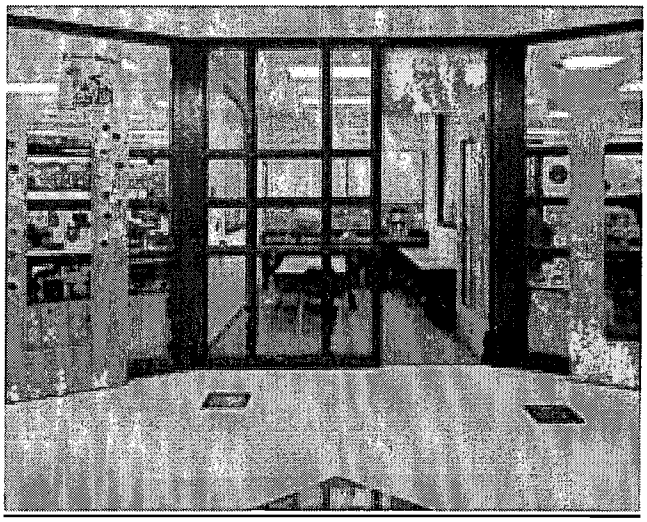
Through terracing the site was maximized for school and community atheletic and recreational fields. A nature trail developed through the wetlands allows use of the wetlands area for both teaching and recreational purposes.

6. What unique strategies allow for flexibility and adaptability to changing needs?

The overall project was design was intended to allow expansion of the academic wing as student population increased. So there is built in adaptability for future growth.

The building has a very simple layout to maximize flexibility. Groups of classrooms clustered around generous corridor areas allow easily supervised use of the corridor as an expansion of the classroom. Multiple small spaces adjacent to classrooms allow different forms of "break-out" project groups to come together during the day as needed. Use of tables and chairs within the classroom allow for flexibility of lay-out within the classroom.

POE Citation Award: Indian Trail Elementary School (K-3), Canal Winchester, Ohio



Architect:
Steed Hammond Paul Inc.
1014 Vine Street, Cincinnati, OH 45202
Principal-in-Charge: Thomas Fernandez, AIA
513-381-2112, tfernandez@shpinc.com

School Information:
Indian Trail Elementary School (K-3)
6767 Gender Road, Canal Winchester, OH 43110
Ms. Susan Bochnovich Superintendent, 614-837-4533
Site Development Cost: $982,752
Date of POE: May 2000

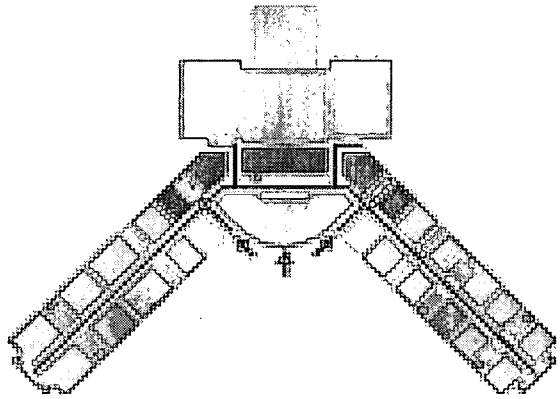
Associate Firms:
Construction Manager: Ruscilli Construction, Roger Mc Loney, 614-876-9484
Mechanical: Heapy Engineers, 614-457-2696
Structural: Graham Obermeyer Partners, Ltd., 513-621-7073

Landscape: Ken Cunningham & Associates Inc., Ken Cunningham, 513-381-7131

Kitchen: Joby Smith, 513-779-7970

Technology: Heapy Engineers, 614-457-2696

Photography: Seth Boyd, 513-684-1729



Planning Principles:

1. How does the project enhance learning (and teaching), and support the needs of all learners?

Every classroom shares a teacher workspace/tutoring room. Students retreat to these workspaces for short tutoring or small-group learning sessions when needed. The feature allows students to remain "connected" to class activities because glass windows do not completely remove them from the group-learning environment. Parent volunteers also take advantage of the workspace rooms when tutoring students during class. The students and volunteers are in full view of the teacher and that helps the students get their work done.

2. How does the design reinforce the school as a center of the community?

The school features two gymnasiums, one on either side of the large cafetorium to allow multiple community functions to take place at one time. Operable, soundproof partitions separate the three areas or allow the formation of one large seating area for student or community activities and events. Adult basketball, volleyball and intramural sports can take place in the gymnasiums, while board meetings and other community functions can be held on the stage. These areas are accessible after school hours and the classroom wings can be closed off.

3. Describe the planning/design process and who was involved.

Through the Schoolhouse of Quality® customer-focused planning and design process, Canal Winchester customers/stakeholders and other important target groups provided input towards the new Indian Trail Elementary School at a variety of different levels of detail. This input was collected within the six Schoolhouse of Quality process principles...(1) Customer Driven, (2) Team Led, (3) Visual Documentation, (4) Customer Confirmation, (5) Design Implementation and (6) Customer Feedback.

Customer Driven

As a first step in the research process, elementary teachers, parents with children in elementary school and community residents without children in Canal Winchester Schools participated in focus group discussions. These randomly recruited community members were brought together to qualitatively uncover and discuss very broad issues of importance/customer values that related to the new elementary school. Approximately 30 people participated in this phase of the research.

Based on the input uncovered in the focus group discussions, surveys were developed to quantify the importance of various customer values, as well as rate how well existing Canal Winchester Schools perform on those customer values. Written surveys were completed among fifty-eight (58) teachers/staff. Telephone surveys were completed throughout the district among eighty-four (84) parents with children in Canal Winchester schools and fifty-seven (57) community residents without children in Canal Winchester Schools. A total of one hundred and ninety (190) people participated in this phase of the research.

Team Led

After developing a strong understanding of the community's values and priorities, an expert building-wide design team made up of teachers, administrators, parents, community members and SHP designers was convened. This team's goal was to develop conceptual solutions to the customer values identified in the Customer Driven phase. Approximately 18-20 people participated in this phase of the Schoolhouse of Quality planning and design process.

Ten (10) smaller department-level design teams were convened to address issues related to the various functional components/departments of the new elementary school. These teams consisted of 3-8 people per group. The purpose of these groups was to provide more detailed input (design parameters) based on the conceptual solutions developed in the building-wide design team.

Visual Documentation/Customer Confirmation

The customer driven concepts and parameters identified in the previous phase were developed more fully and then presented to design team members in the form of 3D computer models, floor plans etc.

Customer Feedback

After the new building was open and in use, feedback research was conducted with the target customer groups (teachers/staff, parents & community

members). The focus of the research was to obtain feedback about how well the new elementary school delivers on customer values/requirements, express what customers like and dislike about the building and uncover the overall community perception of the new facility. A total of one hundred twenty-nine (129) people participated in the feedback research (over 400 people participated in the planning and design process; see www.schoolhouseofquality.com for more details).

4. How does the project provide for health, safety and security, beyond standard approaches?

The school was designed with security and safety in mind. To protect all occupants, the building is secured throughout the day with all exterior doors locked once the students arrive each morning. Anyone who enters the school after that time must enter through the clearly visible visitors' entrance that opens directly to the welcome center and adjacent administration area. The building was designed with a traditional plan layout with two wings and a core area. The core area has all shared functions: administration, clinic, cafeteria, gymnasiums, stage, music classrooms and art and media center on the second floor. This allowed us to break down the scale of the facility.

5. How does the project enhance the use of all available resources?

The site was planned to have a second school opposite the current facility. This allows for one entrance on the site for both schools. We also planned for the same type of vehicular circulation to be used for the second school facility. The school also offers a spacious media center that has numerous reading rooms to provide students with a quiet study atmosphere. Two art rooms, containing pottery kilns and plenty of storage space for supplies, were designed for creative learning.

6. What unique strategies allow for flexibility and adaptability to changing needs?

Planning the site for a second school at the same time the current facility illustrates the scale of changing needs we had to deal with. From the time we started planning the current facility to when construction was complete the District knew the current facility would be full. We had to develop a building floor plan that could be replicated in the second facility. The second facility is currently in design and is scheduled to be completed for the 2001 school year.

Post Occupancy Evaluation *(short form)*

Each firm applying for the SCN & Design Share Awards program were asked to provide comments from 2 stakeholders in each of 4 groups: 1) students, 2) parents, 3) educators and 4) community representatives.

Q 1: What do you think is the greatest asset about the design of the learning environment?

- Student 1 & 2: Due to the age of the students in this school we normally do not ask them to participate in any form of research. See Educator 3
- Parent 1: I like the large lunchroom and I like the big classrooms. (Mother)
- Parent 2: I like the windows that provide natural lighting and open up the classrooms. The hallways allow for easy flow of traffic by students. (Mother)
- Parent 3: I like the way the floors are separated by grade levels. The cafeteria is a multi-purpose room and not only for serving lunch. (Father)
- Educator 1: I like that it is a friendly, homey, secure building. I also like the positive feelings generated by the students. (2nd Grade Teacher)

Educator 2: The art room is very functional. Lots of room and storage. I can see students no matter what they are doing and behavior is much better. (Art Teacher)

- Educator 3: I love our school. I like my room and I am glad of all the storage & individual lockers. The computer room is great to have. The art, music, gyms & library are great too. (1st Grade Teacher)
- Community Rep. 1: I really like the spacious rooms they have. (Female Community Member)
- Community Rep. 2: I like that it is set back off the road where nobody could get to it except through the main entrance. (Female Community Member)

Q 2: What would you change about the design of this learning environment?

- Student 1 & 2: Due to the age of the students in this school we normally do not ask them to participate in any form of research. See Educator 3.
- Parent 1: I don't like the ceiling in the cafeteria. (Mother)
- Parent 2: I wish the classrooms for the special education classes were on the first floor. That's the only thing I don't like. (Mother)
- Parent 3: Its an awful long way from the main parking lot to the building. (Father)
- Educator 1: Sometimes the large windows to the hallway are a distraction to students. (2nd Grade Teacher)

- Educator 2: There is absolutely no way to display things on the walls, so nobody hangs anything up and the environment feels sterile. (Art Teacher)
- Educator 3: I want to display my students work in the hallways, but there are no easy ways to do this. We need more bulletin boards. (1st Grade Teacher)
- Community Rep. 1: They need to have a larger area to pick up kids. It seems a little chaotic when parents pick them up. (Female Community Member)
- Community Rep. 2: I think that they spent too much money on the cafetorium wooded ceiling, that was unnecessary. (Female Community Member)

DISCUSSION

The following are a summary of the comments concerning each of the three award winning POE made by jurors during the competition process.

Davidson Elementary School

The Davidson Elementary School POE illustrates the value of direct observation. Adams Group designed enlarged hallways—or collaborative areas—for students and teaches, and the evaluation revealed just how differently each of these versatile spaces is being utilized. In some cases, hallways are personalized by students. Some teachers set up activity zones in the areas while others use the space for small reading groups. Older students utilize the area for tutorial and conference space. The hallways are so attractive to students that some teachers admit to using the privilege of hallway activity as a reward system. The Davidson POE shows how physical design influences the learning environment as well as the management of the facility.

Davidson received the top POE award for the thoroughness and rigor of its methodology. This project indicates the continuing value of engaging academic researchers in doing a traditional POE that is integrated with the design process.

Central Tree Middle School

Commenting on the Central Tree Middle School POE, jurist Edward Kirkbride said "the content and format [of the POE] show a deep regard and respect for this phase of evaluating an architectural project. This POE, along with that of Davidson, should set the standard for further jury discussions and publication criteria."

The Central Tree POE is very comprehensive and indicates what can be realized with a thorough evaluation process. While the design of the classroom clusters is identical, each grade uses them differently. Five modes of teaching are currently in use: team teaching for the 7th and 8th grades; mini-team teaching in the 5th grade; self-contained instruction with some interface for

special needs; multi-age grouping in 7th and 8th grade math classes; and looping in one of the 5th grade classes. Science classrooms are located adjacent to each other allowing them to work as a single department if needed. Also, for students who learn at a faster pace, the choice of working in small groups is offered. The Central Tree POE finds that the cluster design affords the school the opportunity to define areas by grade level, to extend classroom space into other areas, provide spaces that can be easily supervised, and provide storage and lockers in several areas. The POE also revealed that classrooms should have connecting doors and that clusters need restroom facilities—features not included in the original design.

Indian Trail Elementary School

The Indian Trail Elementary School POE was identified by several jurors as both a promising and unique model for post occupancy evaluation and as a comprehensive research tool. Based closely on the principles and methods of the Total Quality Management (TQM) movement, Steed Hammond Paul's Schoolhouse of Quality has pioneered a continuous improvement process for the practice of educational design. A highly structured process enabled Steed Hammond Paul to conduct a targeted post-occupancy evaluation based on clearly defined design objectives going back to the initial stages of the project. The firm's six principles used in its evaluation process: customer driven, team led, visual documentation, customer confirmation, design implementation, and customer feedback. The Indian Trail POE is a rare example of an evaluation process linked directly to the design process.

The evaluation revealed the versatility of the multipurpose rooms located between classrooms. Small rooms off of the main corridors are used for tutoring, parent-teacher and student-teacher conferences, and planning, while the narrow shared room behind it—and connected directly to the classrooms—are mini computer labs.

CONCLUSIONS

The School Construction News/Design Share Awards Program for innovative school facility planning is a unique venue for sharing the results of post-occupancy evaluations of school facilities recently designed, constructed and occupied. It should not be surprising that only eight POEs were submitted out of thirty-three submittals, and of those eight, only three POEs could be seen as having made a contribution to educational design practice. The literature review and Internet search reveled that on the whole, evidence of post-occupancy evaluation of the educational adequacy of school facilities is weak.

Given the unfamiliarity of POE methodology for most submitters, Appendix A attempts to provide an improved POE question format for the second annual SCN/DS 2001 Awards Program. With the second annual awards program, Design Share, Inc. expects more POE submittals. With these submittals, there is

a concern to guide the submitter's efforts more explicitly to obtain a more rigorous POE.

In addition, the models provided by the three award winners are expected to assist this year's submitters in conducting their own POEs. Davidson Elementary POE illustrates the academic/professional partnership model, while the Indian Trail POE stands alone as a completely integrated model of design and evaluation based on the techniques and tools of Total Quality Management.

Finally, the more promising client-driven organizational model for internal and/or outsourced post-occupancy evaluation should be mentioned. These client-driven POEs promise to be much more integrated with a larger capital improvement program such as in the case of New York City School Construction Authority and the California Department of General Services. No projects from these agencies were submitted, but submissions in future SCN/DS Awards Program may provide a valuable contribution to the methodological advancement of the post-occupancy evaluation of school facilities.

As t he knowledge-bank of post-occupancy evaluations grow from years of the running of the SCN/DS Awards Program, it is entirely possible that the program could make a significant contribution to the institutionalization of post-occupancy evaluation of educational design.

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APPENDIX A: POE QUESTION FORMAT

The following questions have been developed to assist in your efforts to conduct an effective post-occupancy evaluation of your project. We recommend you use this form to obtain responses from students, teachers, parents and other members of the learning community.

Enhance Learning

Question 1:

1a: Question to Students: How has the school building enhanced your learning? Please provide examples.

1b: Question to Teachers: How has the school building enhanced your teaching and your students' learning? Please provide examples.

1c: Question to Parents: How has the school building enhanced your child's learning? Please provide examples.

1d: Question to Community Members: How has the school building enhanced your learning and/or teaching? Please provide examples.

Community Center

Question 2: In what ways, and to what degree do you feel your school building reinforces the school as a center of the your community? Provide examples.

Involve Stakeholders

Question 3:

3a: Where you, or someone you know involved in any part of the planning or design of the school?

3b: If so, do you feel your input, and the input of others you know were taken into account in the design?

Health & Security

Question 4:

4a: Are you comfortable in the indoor environment of the school (e.g., air quality and ventilation, temperature, and natural light)? Provide examples.

4b: Do you perceive your school to be adequately safe and secure from intruders or other man-made hazards? Provide examples.

Resource Development

Question 5: To what degree are you aware that the school in its design and/or management has considered energy conservation measures, recycled materials, or other practices of environmental sustainability?

Adaptable to Change

Question 6: To what degree do you feel the school facility will be adaptable and flexible to change in the future, such as changes in educational programs and practice? Please provide examples.

APPENDIX B: THE 2000 JURY

1. Steven Bingler, AIA, President, Concordia Architects, Consultant, U.S. Department of Education
2. William DeJong, Ph.D., REFP, President, DeJong & Associates, Past CEFPI President and Planner of the Year
3. Bruce Jilk, AIA, REFP, Jury Chair, Planner, the "Zoo School," 1999 US Department of Education's "New American High School Award"
4. Edward Kirkbride, NCARB, REFP, President, UEF-21, CEFPI President's Award, 1998
5. Jeffery Lackney, Ph.D., AIA, Department of Engineering Professional Development, University of Wisconsin, Madison.
6. Frank Locker, Ph.D., AIA, REFP, CEFPI Planner of the Year award, 1999
7. John Mayfield, Ph.D., Educational Consultant, Danton Services International, Skye, South Australia
8. Lorraine Maxwell, Ph.D., Cornell University, Design & Environmental Analysis

9. Prakash Nair, RA, REFP, President-elect, UEF-21
10. Sharon E. Sutton, Ph.D., FAIA, Director, CEEDS, Professor of Architecture, Urban Design, & Planning at the Univ. of Washington
11. Anne Taylor, Ph.D., Hon. AIA, Director, Institute for Environmental Education, School of Architecture & Planning, University of New Mexico.

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