The walls still speak: the stories occupants tell

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Abstract

Purpose – Accompanying the recent concern for the quality of our nation’s educational infrastructure, a growing body of research connects the quality of school facilities to both student outcomes including achievement, behavior, and attitude as well as to teacher attitude and behavior. Less is known about the mechanisms of these relationships. This paper aims to examine the link between school building quality and student outcomes through the mediating influence of school climate. Results build upon those of a recent study that confirmed a link between the quality of school facilities and student achievement in both English and Mathematics, as well as the mediating role of school climate. This qualitative follow-up study explores the complicated intricacies of how a school building’s physical properties influence teaching and learning.

Design/methodology/approach – The study is structured according to a collective, instrumental case study design. Individual, focus group, walk-through and photo-interviews, as well as observations inform the inquiry. Two high-poverty schools are identified from the earlier quantitative study because the ratings of the quality school facilities by their faculties fall within the upper quartile. These two schools, one urban and one rural, are selected purposefully for this study, maximizing learning from cases rich in information.

Findings – Results of the research indicate that ongoing interactions between the original design, the day-to-day reality of the built environment, and the occupants of that environment help to define the learning climate of these schools. Reciprocally, the climate helps to shape the interactions that take place, fostering environmental understanding, competence and control and supporting academic learning. From the data, several broad themes related to building quality emerge as central to this interaction between the built environment and building occupants, including movement, aesthetics, play of light, flexible and responsive classrooms, elbow room, and security.

Originality/value – Through the stories told by occupants of these two schools, we gain further understanding of the interactions between certain building conditions and design features and how these reinforce and enhance the social environment of school, helping to foster a sense of belonging within a place, a sense of control and competence, and a sense of collective commitment to the place and its purposes. As school designers balance considerations of durability with flexibility, the voices of these occupants may serve to argue for the inclusion of design features that allow occupants some measure of control over comfort and use factors. The broad themes related to building quality that emerge from the data include movement, aesthetics, the play of light, flexible and responsive classrooms, elbow room, as well as safety and security.

Keywords Facilities, Quality, Schools, Students, School buildings, United States of America

Paper type Research paper
Taking the Polaroid® camera, seventh grader Amy systematically moved around the school taking ten photos that she felt characterized the way the school building itself impacted her career as a student at Grant Middle School[1]. Later, she returned to the research area and organized her photos into categories. Three photographs of doors she labeled, “First Day.” During the interview, she explained how an imposing and historical structure, much larger than her elementary school, evoked some fear and worry about how she would get along with new teachers and many students whom she had never met before. She represented this early trepidation in her first photograph of the main doors and steps into the building and her next, a line of doorways down a long corridor. Her final photograph in that series was of one door leading into her first teacher’s classroom; the door was decorated with posters, garlands, and flowers, inviting her in and reassuring her that this school, this place, was one where she would belong.

Amy was a participant in a qualitative study of the interplay between school facilities and the occupants of those facilities. A team of three researchers interviewed teachers, parents, administrators, support staff, and students using four interview formats at two different schools. The schools differed from one another in substantive ways, but shared common traits in the quality of the facilities they occupied, solid performance of students in spite of significant numbers of students from low-socioeconomic areas of the community, high teacher professionalism, and a strong emphasis on academics. We wanted to know what stories the building could tell about the people there and what the people could say about the school building. In this study, we sought to explore the complex interplay between a school building’s physical properties and school climate and how these combine to influence teaching and learning.

The manner in which a school building is designed, managed, and maintained cues its occupants and the community beyond about the value placed on educational activities which occur within its walls. Occupants of inadequate school facilities may fail to perceive a clear focus on academic purposes, and the learning environment is less likely to be thought of as orderly and serious (Uline and Tschannen-Moran, 2008). As educators work to influence the physical environment of a school, practically and artfully, on behalf of these primary functions, we increase the likelihood that occupants will derive meaning and purpose from the places where teaching and learning take place day-to-day. In this study, we were particularly interested to know how high-quality facilities nurture a positive school climate and high levels of student achievement in schools that serve a primarily disadvantaged (socioeconomically) student population. Along with a lack of access to rigorous curriculum and highly qualified teachers, these students often attend school in poorly resourced districts, receiving the smallest share of investments in improving facilities across the USA (Arsen and Davis, 2006; Building Education Success Together (BEST), 2006). With a welcoming archway as an organizing metaphor, we explore the interaction between the built environment and the attitudes, perceptions, and behavior of building occupants.

Background
This study provides a follow-up to an earlier study of 82 middle schools in one mid-Atlantic state that examined the relationship of school climate, the quality and cleanliness of the school facilities, and the impact of both on student achievement.
The results of that study confirmed a link between the quality of school facilities and student achievement in both English and Mathematics. Correlation analyses indicated that quality facilities were significantly and positively related to three school climate variables: academic press, teacher professionalism, and community engagement. The quality of facilities was uncorrelated to the proportion of students receiving free and reduced priced meals. The quality of facilities was strongly related, however, to teacher’s ratings of the availability of necessary resources for instruction. Finally, results confirmed that school climate mediates the effect that school building quality has on student achievement and suggests that some building improvements and design features leverage stronger results than others. To facilitate learning, occupants must feel comfortable enough to take the individual and collective risks necessary for meaningful interaction and learning.

**Effects of physical learning environments on educational experiences and outcomes**

For purposes of this study, quality is defined by the perceptions of the inhabitants (e.g. administrators, teachers, students, parents, and custodians) that the building supports rather than hampers student learning and achievement. Features identified in previous research as potentially related to student achievement, such as perceptions of the building as attractive, having adequate and appropriate spaces for learning, and being well maintained were examined. The scholarship reviewed below crosses more than four decades, blending divergent strands of inquiry, including sociology, psychology, geography, and architecture, along with education.

**Educational experiences**

Various elements of the quality of school facilities have been shown to be related to student attitudes and behavior, including motivation, self-esteem, peer and student-teacher interactions, discipline, attention, motivation, attendance, and interpersonal relations, as well as student achievement (Evans, 2006; Lackney, 2005). For example, attractive versus unattractive environments have been found to influence learning. Aesthetic features such as complexity, novelty, surprise, and beauty have been found to stimulate exploratory behavior on the part of students (Berlyne, 1960; Kritchevsky and Prescott, 1969). Environmental props such as pictures improved students’ persistence at word tasks (Worchel and Teddlie, 1976), while similar environmental enrichments also increased persistence on motor tasks (Santrock, 1976). The addition of indoor windows or opening views between rooms appeared to positively influence social interaction between students (Biner *et al.*, 1991), and the impact of various forms and levels of light have been linked to behavior and learning (e.g. Heschong Mahone Group, 1999; Kuller and Lindsten, 1992). Alternately, acoustical concerns such as chronic noise exposure have been shown to hinder cognitive functioning and to impair pre-reading and reading skills (e.g. Evans and Maxwell, 1997; Haines *et al.*, 2001; Hygge *et al.*, 2002; Maxwell and Evans, 2000). School infrastructure quality has also been found to be significantly related to school attendance and dropout rates (Branham, 2004).

Considerable evidence has accrued linking physical environment to pro-social student behaviors that ultimately affect academic performance (Moore and Lackney, 1993; Weinstein, 1979). Contrasts between “hard” versus “soft” environments have been noted in the research with hard environments referring to those physical attributes and spaces that are unresponsive and unyielding, compared to soft
environments that are flexible and responsive, characterized by warm colors, soft furniture, and textured floor coverings. Research has shown that these hard and soft features affect school dynamics, including the quality of student interaction and participation and the amount of vandalism evidenced in a school (Sommer and Olsen, 1980; Casserly et al., 1980). In an extensive review, Weinstein (1979) found that “soft classrooms” encouraged better attendance, greater participation, and improved attitudes toward class, instructor, and peers. Even minor modifications to existing classroom design, such as furniture and seating arrangements, produced increased engagement with instructional materials, decreased interruptions, and encouraged more high-level questioning. On the other hand, density and crowding resulted in dissatisfaction, decreased social interaction, and increased aggression.

Educational outcomes
Specific building features and conditions relating to human comfort have been shown to influence student achievement. These include design classifications including flexible classroom arrangements, clearly defined pathways, positive outdoor spaces, large-group meeting rooms, instructional neighborhoods, and ample egress (Tanner and Lackney, 2006). Features related to the comfort of inhabitants, such as climate control and indoor air quality (Cash, 1993; Earthman, 2004); lighting (Heschong Mahone Group, 1999; Kuller and Lindsten, 1992); and acoustical control (Haines et al., 2001; Hygge et al., 2002) have also been related to achievement. Finally, building age (Bowers and Burkett, 1988; Chan, 1979; Earthman and Lemasters, 1996; McGuffey and Brown, 1978); non-modernized versus modernized and refurbished buildings (Maxwell, 1999) and overall impression (Tanner, 2000) have been linked to the success of students who occupy a school building. Disconfirming evidence from a study in Wyoming that found little relationship between school building quality and student achievement may have been influenced by a restriction of range in that context, as only seven per cent of the schools were rated as in need of immediate attention (Picus et al., 2005).

Students are not the only occupants affected by poor quality buildings. The nature and quality of the built learning environment also has been shown to affect teacher attitudes, behaviors, and performance (Buckley et al., 2004; Dawson and Parker, 1998; Lowe, 1990; Schneider, 2003). As well, the quality of the building influences the community’s ongoing engagement with a school (Uline and Tschannen-Moran, 2008). Berner (1993) found that condition of school buildings in Washington, DC especially the cleanliness and care of the buildings, were related to parent involvement.

It is important to acknowledge that while some influences are clearly physiological, others are related to social factors. These social influences are generally reciprocal and interactive, thus they are somewhat more difficult to define and quantify (Lackney, 1996). These qualities of the school facility create feelings of ease and comfort or, alternately, create feelings of nervousness and irritation. As scholars have investigated discrete characteristics of the school environment, they have typically paid less attention to understanding how individuals construct meaning from these physical features and conditions. The present study seeks to address this gap.

School buildings as primary places for development and learning
Throughout our lives, we develop strong connections to the places where we grow up, live, and work. Our emotional and cognitive conceptions of these physical
environments inform our understandings of ourselves, both as individuals and members of social groups (Knez, 2005). Outside of the home, students spend the greatest portion of their time in school (Gump, 1978; Rivlin and Weinstein, 1995). Here, they continue to develop a sense of self, take stock of their feelings of competence and of their ability to relate to peers and adults.

Given its primacy in their cognitive, social, and emotional development, “school as place [warrants close] attention as a physical entity and continuing experience in children’s lives” (Rivlin and Weinstein, 1995, p. 256, emphasis in original). Undifferentiated spaces become “places” as we come to understand and value them (Tuan, 1977). Key concepts in the literature on people-place relationships include a sense of place, defined as the experiential process created by the setting itself in combination with what a person brings to it (Buttimer, 1980; Hart, 1979; Hay, 1998; Tuan, 1980; Steele, 1981; Jorgensen and Stedman, 2001); place attachment, defined as people’s bonds to particular places (Altman and Low, 1992; Hidalgo and Hernandez, 2001); and place identity, defined as the dimensions of self that develop in relation to the physical environment (Proshansky, 1978). Researchers across disciplines appear to share the common assumption that through attachment to places “a person acquires a sense of belonging and purpose which gives meaning to his or her life” (Proshansky et al., 1995, p. 90). An in-depth review of the expansive literature exploring human attachment to place exceeds the scope of this paper (see, for example, Canter, 1977, 1997; Relph, 1976); however, our particular interest in school as a primary place of meaning for children (as well as for other stakeholders) begs particular attention to notions of place identity.

Place identity connotes those dimensions of self that develop in relation to the physical environment (Proshansky, 1978). Although we tend to emphasize the role social environment plays in the development of self, “the places a child grows up in, comes to know, prefer, seek out or avoid also contribute significantly to self-identity” (Proshansky et al., 1995, p. 104). To the degree that certain places are familiar, useful, and malleable, these places help children maintain a sense of self, including the definition of that self (Proshansky and Fabian, 1987). Studies of place preferences in children and adolescents provide similar evidence, with youth also favoring places that bolster self-esteem and nurture self-concept (Newell, 1997), including private, personalized, and natural settings (Rivlin, 1990; Owen, 1988; Sobel, 1990) that are relaxed, calm, and comfortable, (Korpela, 2002, p. 366). According to Chawla (1992), enduring memories of favorite childhood places inform more immediate experiences. As these places have provided a sense of security, opportunities for social affiliation, and a context for creative expression and exploration, youth continue to seek similar places to foster their ongoing self-development. In fact, research suggests that adults, too, consciously choose environments supportive and reflective of their sense of self. Where they experience incongruence, adults attempt to alter the setting or relocate (Twigger-Ross and Uzell, 1996). A high-quality physical environment, in and of itself, may not suffice, however. In fact, there is no physical environment that is not also a social environment and vice versa (Ittleson et al., 1974). Such a dynamic view acknowledges positive as well as negative feelings associated with a broad range of physical settings (Fried, 2000; Manzo, 2003; van Andel, 1990).

In order for occupants to reach their potential to produce cognitive and affective growth, it behooves us to consider this interplay between the physical environment
and their conceptions of the activities and behaviors contained therein, the social climate of the place, and the relationship of both to occupants’ developing sense of themselves. In what ways does the meaning that participants make of their physical surroundings impact the seriousness with which students and teachers approach their work? How do specific structural and furniture arrangements impact the quantity and quality of the professional relationships between teachers, and those of students? And how do these arrangements impact connections between schools and the communities that support them? These were the questions that provoked this study.

**Study design and methods**

Structured according to a collective, instrumental case design (Stake, 1995), two schools during an earlier study were purposefully selected in order to maximize learning from cases rich in information (Stake, 1995; Patton, 1990). As a sampling strategy, we identified schools from among the population of middle schools that participated in the original study in which the faculty ratings of the facilities were in the top quartile of those surveyed and where more than 50 per cent of the student population received free and reduced price meals. We narrowed the sample further by identifying one urban and one rural school that met these criteria, employing balance and variety, further extending the opportunities to learn. The primary research question that directed this phase of inquiry was to explore the manner specific indicators of building quality were associated with a positive school climate, fostering occupants’ relationship to the school as place, thus bolstering their capacity to teach and learn. Secondary questions included:

- How, and to what degree, are specific indicators of building quality associated with a clear focus on academics, a sense of enthusiasm on the part of teachers, and a constructive relationship between school occupants and the community?
- In what ways do occupants leverage the design qualities of new and renovated facilities on behalf of teaching and learning?
- In what ways do occupants compensate for the limitations of existing facilities in order to develop and nurture a positive school climate?
- To what extent are specific indicators of building quality connected to the occupants’ individual and collective identities as learners?

**School profiles**

We were interested to learn how high-quality facilities nurture a positive school climate and high levels of student achievement in schools that serve a primarily disadvantaged (socioeconomically) student population. We hoped to learn more about the ways occupants made meaning about the place called school and about the impact that meaning had on their attitudes and behavior.

*Alfred H. Grant Middle School.* Situated in an historic city neighborhood and surrounded by large, older homes, Grant Middle School is characterized by Spanish architecture, with a red tile roof that is echoed across the rooftops of several surrounding homes and buildings. Tile medallions surround the doorways with large, ornate columns, creating a majestic entrance to this three-storey building. The tile medallions were echoed around the exterior of the building, as well as in the entry hall, providing decorative accents and aesthetic appeal. Built first in 1926, Grant had
experienced a number of significant renovations in the five years prior to this study, including the installation of central air conditioning, improved lighting, a wheelchair lift and ramp to make the building handicapped accessible, the addition of acoustical tiles and a new curtain in the auditorium, roof repair, and a fresh coat of paint. As a personal gift from a city council member, new metal venetian blinds were installed throughout the building to replace the dilapidated originals. Finally, plans were underway for the restoration of the stately balustrade that spanned the front of the building, the longest in the city, creating a wide, welcoming terrace at the entrance. The landscaping was the work of parents willing to make an investment of effort in the beauty of the school.

The grandeur of the building might suggest a very affluent student population, but looks can be deceiving. Approximately, 30 per cent of the school’s population was bussed from a lower socioeconomic neighborhood across the city, another 30 per cent lived in the neighborhood where the school was located, and the rest elected to attend as part of a school choice initiative. Grant was home to 467 students in grades six through eight. The student population was primarily minority (85 per cent) and two-thirds (66 per cent) were eligible for free and reduced priced meals. Grant students generally did well on state performance assessments with many students going on to highly selective high schools after their eighth grade year; many also went on to college after completing high school. According to the state accountability ratings, Grant had been fully accredited for the four years prior to this study.

Newcastle Middle School. Newcastle Middle School is situated on a road adjacent to a rural two-lane highway in the middle of a small town. Approximately, 538 students in grades four through eight attended school there; most rode busses with routes that took them far into this rural area. On the approach to Newcastle Middle School, the gabled roofline invites visitors with a home-like feel. The marquee out front is frequently updated celebrating student achievements and announcing upcoming events. Newcastle was originally built as a high school and the wing now serving the sixth grade was added in 1964. In 1992, the school was renovated and converted to a middle school. The auditorium in the school is a community focal point. Visitors entering the school find a large lobby filled with park benches, plants, and display cases. Across the lobby, the school office is enclosed in large glass windows and serves as the hub of classrooms, library, and auditorium. Newcastle Middle School had been fully accredited for four years leading to this study, with students generally achieving well on state performance tests, despite a student population that was 53 per cent minority and with over half of the students (52 per cent) qualifying for subsidized meals.

Data collection
Four sources of data informed this study, including individual and focus group interviews, walkthroughs interviews, and student-generated photographic documentation conducted at each of the case-study schools (Denzin, 1970; Merriam, 1988; Patton, 1990; Stake, 1995; Capello, 2005), allowing researchers to triangulate their findings.

Interviews and focus groups. Interviews were conducted according to semi-structured questions about various features of the school building and how these characteristics and conditions supported and/or impeded communication, interaction, and learning among students, teachers, and parents. The semi-structured interview format took advantage of the “codable nature” of pre-established categories
(Fontana and Frey, 2000), while still encouraging a certain degree of open-ended response from participants. Interview protocols were similar across participant groups, acknowledging the need for some tailoring of questions in response to the roles, responsibilities, and experiences of various occupants, at the same time allowing for comparisons of responses across these groups. The school administrator and the school custodian represented two primary individual participants. Focus groups included a sample of teachers, students, and parents representing key building occupant groups. All interviews took place at the school site, with a total of 20 research participants at each school.

Specialized research methodologies. In addition to the individual and focus group interviews, two specialized data collection methodologies were employed in this study: student-created photographs with subsequent debriefing and walking interviews. For the photo-documentation, students used Polaroid cameras to document the ways their school building impacted their learning. Photographs are useful artifacts in documenting and obtaining knowledge (Harper, 2005; Collier and Collier, 1986). Following the photo documentation activity, researchers then invited students to group their pictures into categories of the students' choosing. Using an interview protocol, researchers asked students to describe why they chose to make the photographs they did and how the subjects of the photographs do or do not contribute to the school's learning environment (Cresswell, 1998). Using established "hall pass" procedures; students were supervised, but not directly accompanied by the researchers in order to free the subjects from any preconceptions.

The walking interview provided opportunities to experience the school facility in the company of representative occupants, learning how they respond to the physical features and conditions of the school (Nelson, 2001). A student, parent, teacher, and administrator were asked to take the researchers on a tour of the building and to share their perceptions and feelings, as well as how they made meaning in response to the symbols and arrangement of space.

Data analysis
All interviews were audio-taped and transcribed. Observations were hand written as field notes. Data were organized, classified, and coded using manual techniques as well as HyperResearch, a computer software program designed to handle unstructured qualitative data (ResearchWare, 2007). Data analysis occurred continuously throughout data collection as the researcher attempted to identify emerging themes, as well as tease out anomalies and contradictions (Holsti, 1969; Merriam, 1988). Some preliminary categories were generated from the literature and altered as additional themes and patterns emerged (Fook, 2002). The research team electronically managed this list of emerging themes when coding and analyzing data. See the Appendix for some descriptors and examples from the coding process. Thematic analysis occurred both manually and via the computer software program. The use of member checks, as well as the maintenance of an organized documentation system, helped confirm the research findings. The privacy and confidentiality of all participants was maintained through the use of pseudonyms. Informed consent involved full review by two University Behavioral and Science Review Boards, as well as local school district review processes.
Findings
Two very different middle schools within two significantly different contexts formed the basis for this collective case study. What they had in common was a positive learning climate, positive building qualities, greater than 50 per cent of the student population qualifying for subsidized meals, and high-achievement rates. Of note is the recognition that occupants of both buildings found a sense of place and sense of community that contributed to both overall climate and achievement. Similar observations regarding how the facility functioned in service of learning were found in the rural and urban buildings.

The personality of space and the identity of occupants
The particular personality of various spaces within a school may encourage a sense of belonging and foster a collective commitment to shared learning goals. Personality of space may be viewed as the amalgam of the various attributes of the space; these include changes to the building over time, historical events, affect of the people who inhabit and modify the space, the organization of the space as designed, and so on. The self-identities individual occupants construct result, in part, from the built environment, which in turn was created by past occupants, designers, and community supporters, whose previous interactions continue to influence learning over the life of the building.

At both Grant and Newcastle, student informants had clearly formed identities as members of the school community. In fact, students and teachers at both schools had difficulty thinking of school life elsewhere. When asked if she would be a different person if she attended another school, Nicki, a student at Grant, stated, "I can't even imagine attending a different school." Likewise, a Newcastle employee spoke up as the researchers left the school office at the end of the day, reiterating why she had taught there for almost three decades.

Significant to the many facets of adolescent identity development, a prime task of this age, this attachment is often a balance of many roles adolescents adopt (e.g. Violand-Sanchez and Hainer-Violand, 2006; Carter, 2006). Of interest is identification as part of a school community and the role the school building plays in this aspect of identity formation. According to one teacher at Grant, “Here, students do have that space that they can kind of be themselves in.” Nicki photographed the podium in the auditorium at Grant Middle School in preparation for her interview. She told us students’ voices could always be heard at Grant. “I love being listened to, so when I got on the stage for the first time, I thought, ‘Cool.’ After everyone left, I sat there for a minute and I was like, ‘This is my space!’”

A group of five students provided a photo tour of the building at Newcastle. While the students were aware of the researchers’ interest in the building itself, no other directions were given. The tour started in the lobby area where students pointed out and photographed display cases, the national flag, and benches the principal placed there to increase interaction. Newcastle’s principal told researchers, “I want them to use the lobby. It’s theirs. It is their building, built by their parents.”

From there, the tour moved to the fourth-grade wing where students, unprompted, pointed out the student-created wall displays. These displays lined the walls of the back hall, formerly a difficult area for supervision. We observed that the administration had given over the walls to student expression; as a result, there was virtually no graffiti, vandalism, or litter in the hallways. Contrast a study from California where the school
walls were described literally as a battleground with graffiti artists claiming territory and school administrators asserting authority by marking, re-marking, or covering the walls (Staiger, 2005). At Newcastle, the walls, instead, served the function of participation and shared authority at the school with student learning as the primary focus.

In both schools, the students had difficulty talking about the school building as separate from the learning activities and the relationships they experienced within it. About Grant Middle School, Nicki commented, “Though it’s old, you get a sense that someone cares […] this one [school] was different […] It’s like shining lights coming out of it!” finishing with an upbeat little singsong chant.

Teachers, like students, create an identity that is situated within the work place of school. Buildings, as both object and technology, represent a means of creating a teacher identity that convey values about space, learning, and community (Hughes, 2004). At Grant, teachers talked about their individual development as teachers as part of the collective history of the place. According to one Grant teacher, “Many residents of our city celebrate its rich history. This building stands as a symbol of this history and we’re a part of that.” Echoing this sentiment, another teacher at Grant opened a closet door to reveal an early twentieth-century kitchen unit in the teachers’ lounge that was no longer serviceable but was still a source of historical pride. The main hallway at Grant held pictures of graduating classes from the school throughout its history. One African-American student had an aunt who had been a student at Grant shortly after the school had become desegregated, and pointed with pride to her aunt’s picture in one of those class pictures.

The ongoing interaction between the design and reality of the built environment and the occupants of that environment helped to define the climate of the place. Reciprocally, the climate helped to shape interaction between and among people and between people and the built environment. These interactions further fashioned the personality of particular spaces at both Grant and Newcastle. As building occupants shared in the creation of the environment, they revealed an individual and collective sense of themselves as members of their school community. In turn, the environment gave back, reinforcing self-identity and perhaps even changing members in some way. The result was a deeper sense of belonging within each setting.

**Themes related to building quality**

From the data, a number of broad themes related to building quality emerged as central to this interaction between the built environment and building occupants, including movement, aesthetics, play of light, flexible and responsive classrooms, elbow room, and security. These features of the built environment appeared to reinforce and enhance the social environment of school (Uline and Tschannen-Moran, 2008), holding special significance to the occupants and positively influencing their perceptions of their school and their relationship to it. These positive perceptions, in turn, appeared to foster environmental understanding, competence and control, as well as to support academic learning. Although described separately, we acknowledge that the themes are overlapping and interrelated.

**Movement**

A clear sense of entrance and circulation influences the educational function of a building (Castaldi, 1994). Researchers coded 27 separate and distinct references to the importance of
unfettered movement. These observations extended across all participant groups at both schools, including students, teachers, parents, custodians, and principals. Recall Amy’s relief on the first day of school when she easily found her way to her classroom, realizing that the transition to this middle school would be manageable. Thresholds and pathways are important variables in occupants’ perceptions.

Thresholds are spaces of significant transition where expectations are heightened, mental models shift from place of origin to destination, and the mind prepares for the upcoming experiences, interactions, and tasks (Eberhard et al., 2005). The specific features of key thresholds at both schools appeared to provide occupants a sense of welcome and anticipation. Students, teachers, parents, and the principal focused particular attention on each school’s front entranceway. According to one Grant teacher:

We have a terrace at the front of the building. You don’t walk straight to the door. You know exactly where you are going, but you meander your way there. You get time to stop and smell the roses.

An open commons area, inside the main entrance and adjacent to the auditorium, has become a focal point for the Newcastle school community. When the current principal first arrived, the commons was a sterile environment devoid of furnishings. Fights often erupted there. Subsequently, students were prevented from using the area anytime during the school day. To change the negative dynamic previously associated with the front lobby, when Mr Kelly took over as principal at Newcastle, he added benches, potted plants, and trophy cases (Plate 1, lobby). He welcomed students who arrived at school early to wait inside. Students began sitting on the benches, working and chatting, often interacting companionably across age and grade levels.

Plate 1.
Ben’s photo: lobby
The commons became a gathering place at all times of the day, as parents also used this space when they came to volunteer or attend events. The lobby featured prominently in the photographs of student research participants. A Newcastle parent reported, “It is like a meeting area for parents and kids to get together.”

Classroom doors were a prominent feature in the photographs of student participants at both schools. In each photo, the door was decorated in some important way. The transoms above the doors at Grant often included artwork and three-dimensional displays that represented the teacher and students who occupied the room. At both schools, but especially at Newcastle, the doors and spaces around the doors were used as extensions of the learning space. Content-area posters and student-created artwork related to topics studied in that particular classroom were prominently displayed. From a Newcastle student, “The people hung this up, because it was so important and if we read it, it will teach us.”

As pathways defined the nature of traffic flow through a school building, they appeared to make a significant difference in school climate. Well-designed hallways allow occupants and visitors to move comfortably through a school (Tanner and Lackney, 2006). Mr Kelly, the Newcastle principal, commented, “I like the hallways. Look how wide they are.” Design solutions should avoid mixed signals, applying visual clues where possible. Kelly reported reassuring incoming students fearful of getting lost in their new school by sharing a mental map of the space, saying, “Don’t worry, I’ll show you; it’s just a big a square.” He also shared his description of the color scheme assigned to each grade-level wing, with color-coded lockers and skylight trim that helped students know where they were. “They are color-coded by grade level. The skylight matches the lockers. The eighth grade hall is yellow, seventh grade purple, and sixth grade green. This is home base.”

A parent at Grant described her daughter’s response to the school’s long straight hallways where each grade-level team’s classrooms were situated in close proximity to one another. Unlike the other monolithic middle schools she had visited in the district, her daughter found Grant “homelike.” In particular, she mentioned the staircases with broad landings between floors. As a frequent volunteer at the school, this parent observed that this design feature helped to manage traffic flow.

Aesthetics and signature features
At its most fundamental, the aesthetic pertains to a sense of beauty and concerns human emotion and sensations. The aesthetic features of a school can cultivate a strong sense of belonging that can generate enthusiasm for learning (Jarman et al., 2004). Both schools boasted particular features to which occupants felt special attachment. A Grant parent talked about the “magic” of the place and how the combination of architectural features sparked curiosity and imagination. “It is not the typical environment. This one invites you to use your imagination and that is where you should be able to go inside a schoolhouse.” This parent described the building as “tactile.” “You want to reach out and touch it, explore the surfaces with your hands.” One Grant teacher, Mrs Foster, came to work in her classroom one Saturday when a construction crew was using a cherry-picker truck to complete window repairs. She asked if they would lift her to the level of the blue medallions that adorn the façade of the building. She then photographed a number of the tiles and created refrigerator magnets of the images to give as gifts.
In both schools, the auditoriums were particular sources of pride. In fact, all participant groups across both schools noted their importance. Building occupants at Grant placed a high value on the auditorium’s tall windows and crown. When the original acoustical ceiling tiles loosened, the installation of a drop ceiling was posed as the most cost-effective solution. Instead, the Parent Teacher Association (PTA) raised the additional funds necessary to replace the tiles with large acoustical wall panels, still preserving the original beauty of the windows and molding. At Newcastle, the auditorium was the site of many community cultural events. Participants were proud of the quality musical and theatrical performances they were able to host due to the availability of this high quality, shared-use facility, resulting from an effective community partnership.

**Comfortable and welcoming appearance.** Occupants described both schools as comfortable and welcoming from the outside in and the inside out, characteristics to which they themselves contributed. Although a newer and larger structure, Newcastle boasted a façade specifically designed to create a welcoming appearance. Says Kelly, “The front roofline is like a porch. Your mind distinguishes between a home with a gabled roof and an industrial building with a flat roof. You put the school into that different category when you change the roofline.”

At Newcastle, one teacher pointed out the valences she had put up above the windows. When asked about these, she offered her perception that the students behaved better when the environment felt warm and welcoming. These window valences were common in both schools, with the PTA providing them for all the windows at Grant. According to Mrs McCall, “They make it more like home, and this softens their spirits and makes them feel more connected to each other.”

**Cleanliness.** An unanticipated finding of our earlier study (Uline and Tschannen-Moran, 2008) involved the cleanliness and neatness of the building. This factor functioned independently of the other indicators of building quality. Further, the mean for this indicator was higher than that for the other items in the scale; even where participants rated their school buildings as lacking in other areas, they were generally kept clean and neat at least.

When asked what physical features support a positive learning climate for both students and teachers, informants across all participant groups at both schools cited the important role clean, well-maintained schools plays in the learning and teaching process. This factor of building quality was addressed 29 separate times across various interviews. Most were comments related to the effective maintenance policies at both schools. Only one teacher at Grant gave poor grades to the school’s air quality, citing poorly maintained ductwork as the cause. At Newcastle, the custodian described a specific air quality committee charged with these responsibilities. At both schools, people talked about a collective commitment on the part of adults, as well as students, to ensuring a clean, well-maintained learning environment. It was a matter of pride. One Grant student insisted:

> Everyone pitches in. When you see something on the ground, you pick it up. If you care about something like the school, when you see somebody doing something they are not supposed to do, you tell them to stop.

Adults at both schools agreed that this single factor communicated a compelling message to their students. “I feel more than anything else, it is how the building is
maintained that really tells kids, “You are important and we want you to learn.” These norms were not universally shared, however. One Newcastle teacher shared her dismay at the lack of cleanliness of the children’s restroom facilities, and several Grant students were observed dropping litter on the terrace as they left school at the end of the day.

Flexible and responsive classrooms

It should come as no surprise that the adequacy and responsiveness of classroom space emerged as central to participants’ appraisal of the overall learning environment. Previous researchers have found that the arrangement of classroom space influenced the interactions between the teacher and students (Gump, 1987; Rivlin and Rothenberg, 1976). More recently, intelligent classrooms, which make extensive use of information and communication technology, have been found to impact student interaction and learning (Tiburcio and Finch, 2005). For teachers in this study, influence and control over their physical settings were highly valued. Students identified variety, flexibility, and functionality as key characteristics. Mr Boone, principal at Grant, and custodians at both schools gave teachers free rein, and parents observed the classroom as a reflection of the individual teacher’s personality. A Grant teacher suggested that, “every classroom in itself holds its own unique quality, adding educational value.”

Issues of control over physical comfort were prominent at both schools. Teachers valued greatly their ability in both schools to open windows to allow the circulation of fresh air. Students in classrooms where windows could be opened have been found to progress seven to eight per cent faster than those with fixed windows (Heschong Mahone Group, 1999). Teachers at Newcastle also appreciated having individual climate controls in their classrooms. Mrs McCall noted that teachers differ in their temperature preferences, reporting that the teacher she teamed with liked the temperature to be 3° or 4° cooler than she tended to like it. Individual telephones were a relatively recent addition at Newcastle, and Mrs McCall commented that the addition of the telephones had reduced the sense of isolation among the teachers and had allowed for greater collaboration with parents. She also pointed out the small black button on the intercom system that teachers could push if they needed the immediate assistance of another adult, noting the sense of reassurance that these brought to teachers as they anticipated safety concerns that might arise. One issue of control that has been reported in previous research but did not emerge in these data was acoustical controls, or the ability to avoid distracting and irritating noise. In neither the urban nor the rural setting was noise a topic that respondents raised.

Teachers valued having the flexibility to arrange the space in their classrooms to various purposes. Custodians at both schools reported frequent requests to retain seating changes. A Grant custodian reported, “They switch it up often, depending upon the activity.” The Newcastle teachers concurred. “The classrooms are very well designed. You’ve got plenty of space for equipment and technology. The kids are not elbow-to-elbow. It’s very efficient when you do group work.” At Newcastle, Mrs McCall reported that her current classroom was the largest she had had in her long teaching career. Through the strategic placement of bookcases, she created three literature circles, furnished with floor pillows. She reported that she could have three groups of students simultaneously discussing three different books. “Each group has a different novel. They are able to read and interact without bothering each other.”

The walls still speak: the stories occupants tell
The students at Grant and Newcastle seemed to conceive of their learning as sprawling. When we asked about places that supported their learning, their answers challenged the more traditional architecture of self-contained classroom instruction. They talked about portable laptop labs, lab tables with electrical outlets, workbenches and tools, the music room filled with guitars and drums and accordions, the library where they conduct research and the computer lab, explaining that, “a lot of kids do not have internet access at home, so this is good for them.” Veronica at Grant photographed the art room as a favorite place for learning during and after the school day (Plate 2). The principal at Newcastle also described how instruction deliberately spilled out beyond the classroom walls. According to Kelly:

The students experiment with planting things. So, we gave them above ground garden boxes on this little secluded area. One box was flowers and the other, vegetables. They did all the planting and we ate tomatoes all summer long!

In each example, the research team found a careful transaction where students were afforded access and freedom to move about within classrooms, between school spaces, and within common areas. Physical barriers to movement were not the primary means of establishing control; rather, the schools’ leadership teams cultivated norms of behavior that resulted in a positive learning climate and a clear focus on academics throughout the building, regardless of location.

Play of light

Windows and views, as well as various forms of light, have been linked to behavior and learning, with daylight offering a more positive effect on student outcomes potentially due to its biological effects on the human body (Heschong Mahone Group, 1999;
Mayron et al., 1974; Wurtman, 1975). Views to the outside provide necessary visual rest and relief (Kuller and Lindsten, 1992). At the same time, control of light and the role it plays in the occupants’ mood, school security, and time on task are important factors noted by each group of informants in the present study.

The abundance of natural light was highly prized at both Grant and Newcastle. At Grant, the light streamed through windows that stretched to the crown of 12-foot ceilings. A sixth-grade teacher at Grant had left the year before to teach in a suburban school, but she returned after just a single year away. Her suburban classroom lacked windows. She had returned, she said, because she missed the sense of community at Grant, but also because she missed those “tall, beautiful windows.” She commented, “It can be drafty next to the windows in the wintertime, but they are worth it!”

It was evident that attention to natural light played into the plans when Newcastle was renovated 15 years earlier. Three large skylights were added, each at the intersection where a grade-level wing diverged from the main hallway. The skylights and chandeliers were one of the important features that eighth-grader Claire captured in her photographs, giving them the label “Unique Lighting/Abstract” (Plate 3). Eighth-grader Claire presented a photograph of a hallway without a skylight in an older section of the building; she labeled this hallway as “Dismal”.

**Elbow room**
Both schools boasted relatively small student populations. According to a state education website, Grant had 467 students with 28 teachers, a ratio of 1:17. Newcastle began the year with 538 students and 51 teachers, a ratio of 1:11. The researchers did not observe crowding in any classrooms. Chaney and Lewis (2007) indicate that wear
and tear and negative effects on classroom environment are potential results of over-enrollment, defined as a condition caused by actual enrollment exceeding design specifications. Neither of the case study schools could be described as overenrolled, and neither of the schools made use of portable classrooms.

While the cubic footage afforded by the high ceilings at Grant gave the impression of spaciousness and reduced the sense of crowding, one teacher at Grant did note the challenge of contending with the very real limitation of the square footage. In contrast, the students at both schools felt that there was ample room in classrooms. When researchers asked students at both schools whether the furniture created or added to a sense of overcrowding, they reported that it did not.

The concept of space-as-reward is noteworthy. At Grant, students were given more freedom to move about the cafeteria during lunch as the school year proceeded and student behavior warranted the increased freedom. Norms for behavior replaced strict and unbending rules or physical barriers to the space itself. At Newcastle, the central courtyard was a reward during good weather for students whose behavior warranted increased freedom and access to school facilities.

One group of photographs Amy, a Grant student, created was comprised of three images she called “Friends Time” (Plate 4). The first image was of the school cafeteria, the second was a classroom, and the third was a girls’ restroom. In school, adults necessarily scrutinize student behavior, yet the students felt privacy was important. When we questioned her about why this photograph fit in the category of friends’ time, Amy explained that it was a place where she and her friends could talk without interference from adults. Cafeterias at both schools were small enough to be socially intimate. Three students photographed the cafeteria at Newcastle and described the social life of this space.

Plate 4.
Amy’s photograph:
friends time
During the research team’s observations and walking tours, students were often observed in collaborative activities in classrooms, yet most informants did not equate this with the concept of social development or of classrooms as social spaces. Rather, the team found participants, regardless of role, thought of libraries, cafeterias, entryways, and auditoriums as the spaces most conducive to social development and construction of students’ identities as thoughtful learners.

Security
A sense of security and safety were key features that contributed to the positive experiences reported by occupants at both schools. The other features discussed in this paper interacted to produce the strong sense of security present on both campuses. The design of hallways at Grant made it possible for staff to see long distances unobstructed by corners and intersecting hallways. Light made it possible for teachers and administrators to see what was going on. Decisions and, perhaps, circumstances combined to permit both schools to remain small in terms of total population while class enrollments also remained relatively low. Since students and teachers felt that most areas of the school were not overcrowded, the possibility of movement without being in others’ personal space was likely a significant factor in the schools’ overall learning climate and the safety occupants felt in being there.

At both schools, teachers were concerned about security, but primarily their focus was on what students were doing. The custodians, on the other hand, felt that an important part of their role was one of security – often focused on what students were doing in the hallways and common areas and also on security from the standpoint of who comes into the school (locked doors, etc). Students commented on security less, but this may be a result of school climates where the students felt secure, and as a result did not think about it as much.

Discussion and implications
Our findings suggest that inhabitants did indeed influence the school place they occupied; at the same time, the school place influenced and shaped the identities of the human occupants, individually and collectively (Cooper as cited in Proshansky et al., 1995). Further, the schools in this case study characterized the interaction between leadership and design; that is, how school leaders envisioned and used the school spaces was a critical attribute. Conversely, the spaces were flexible enough to permit leaders to make good use of the space in such a way that occupants could construct a positive identity for the places individually and as a community. Because these themes are complex and interlocking, we employ a metaphor to describe the themes and demonstrate how school leadership and building design interact to improve school climate. Metaphors highlight relevant attributes and add coherence to complex systems (Lakoff and Johnson, 1980). We use the arch as a metaphor of the interplay between the themes we found (Figure 1). The arch, as a design feature, provides a solid structure around entry points that either facilitate or block movement. An arch can surround either a locked gate or a familiar and known point of entry.

In the arch metaphor, community and a sense of local history are the keystone on which all else rests. A semi-circular stone arch also consists of pillars and wedge-shaped stones that use compressive force, keeping the structure intact. The leadership-school design arch is built on pillars of school design and the influence of the occupants on the
one hand, and the interaction of the occupant's identity and the personality of space on the other. Over this, six themes provide the interlocking characteristics of facility quality: movement, aesthetics, flexible and responsive learning spaces, the play of light, elbow room, and a sense of safety and security. Entering the span, or opening, the school's climate (academic press, teacher professionalism, and community engagement) interacts with all these characteristics of facility quality, mediating their combined influence on student learning and achievement.

In both cases we studied, research participants described the ways in which the built environment facilitated daily activities and interactions. They also recalled circumstances that moved them to confront existing problems and/or acknowledge missed opportunities. Teachers, leaders, parents, and custodians actively challenged existing spatial routines through re-conceptions of classroom arrangements, enhancements to entryways, changes in paths of movement through the building, and modifications in cafeteria seating and lighting, to name a few. Although various aspects of the built environment might have introduced constraints on learning, the occupants and important stakeholders made significant choices about the spaces within the building, the results of which contributed to improved learning. In both case study schools, educational leaders worked flexibly with other occupants, discovering how the design features of the building could be leveraged to improve both climate and achievement.

While building design can be inflexible at some levels; in other ways, occupants are more comfortable when they control elements of the environment. We postulate that the degree of control occupants of the facility might exert over the built environment contribute to the school climate. Brand (1994) suggested that changes to the built environment can be characterized as layers that are increasingly difficult to control. The topmost layer, the site, is the geographical setting and is almost impermeable to change. The structure itself and external features (known as the skin) are potentially malleable.
The services layer includes heating and air conditioning, wiring and so on. The services layer is not typically within the control of occupants, but control over such elements as temperature settings and window openings contribute to perceptions of school climate. The space plan layer, which includes walls, ceilings, wiring, furnishings and accessories, is potentially the most changeable and accessible layer occupants might control. Notably, the artifacts most often featured by students, such as artwork on the walls, represent the lowest of Brand’s shearing layers (stuff, space plan, and, to some extent, services), those things that potentially could be changed and were within the control of the building occupants. Design features that allowed occupants flexibility in the use of space were highly prized in the schools we examined. As school designers balance considerations of durability with flexibility, the voices of these occupants may serve to argue for the inclusion of design features that allow occupants some measure of control over comfort and use factors. Just as usability logic has found its way into software design, school architects increasingly create adaptable systems with regard to light, temperature, and physical arrangements. School leaders may not just allow, but encourage, occupants to exercise control in personalizing their spaces through classroom layouts, furnishings, and decoration to generate a greater sense of identification and ownership, cultivating pride of place. Furnishings are among the elements that can be most readily moved about and made to accommodate or impede human activity that occupants directly control (Brand, 1994). Students, too, desire a sense of control in their school buildings, the ability to move about without feeling fenced in, and to have places to gather socially.

School designs that facilitate students’ independent navigation within the building foster feelings of safety and confidence. When students can “read” a school building, they feel independent and self-assured. Further, acquired skills in environmental understanding, competence and control serve the larger goals of academic learning. Designs that incorporate familiar landmarks in the form of color codes, symbols, and familiar images, serve to assist children in acquiring these skills. Likewise, adults can encourage more experienced building users to assist new occupants in learning these spatial cues and patterns of movement. Such peer teaching benefits both the novice and experienced occupants.

The buildings we studied were places of pride within the communities they served. Each stood as a repository of the history of people who had worked and learned there. The colors, shapes, textures, and unique features of each school added to its aesthetic, engaging occupants and engendering in them a sense of affinity to the school as a place of learning. This pride of place served the educational mission of these schools, strengthening bonds of connection between the participants and facilitating and celebrating the important work contained within their walls.

**Conclusion**

The results of this study reinforce findings from earlier research on the interaction between the built environment and the occupants of that environment, as well as on the relationship between building quality and student behavior and learning. The broad themes related to building quality that emerged from the data, including movement, aesthetics, play of light, flexible and responsive classrooms, elbow room, and safety and security echo findings from across this growing literature. Through the stories told by occupants of these two schools, we gain further understanding of the mechanisms
of these interactions and relationships, learning more about how certain building conditions and design features helped to foster a sense of belonging within a place, a sense of control and competence within a place, and a sense of collective commitment to the place and its purposes.

Note
1. All names are pseudonyms.

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<td>Competence “I found my own way around.” “Then by eighth grade we are all over the building.”</td>
<td>Competence “I found my own way around.” “Then by eighth grade we are all over the building.”</td>
<td>Independence “I tell them, ‘Go to the yellow hallway and take a left.’ I want them to use the lobby. It’s theirs”</td>
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<td>Play of light</td>
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<td>Openness “We have skylights down the hallways and they bring in lots of light.”</td>
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<td>Space “Kids work on special projects in classrooms. I’ve been in the schools when they didn’t have enough space. Somehow it all seems to work here.”</td>
<td>Space “Just a lot of space. It doesn’t feel like you are closed in.”</td>
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<tr>
<td>Safety/Security</td>
<td>Well-being “You feel like you're going into a safe environment.” “You don’t have hidden corners.”</td>
<td>Well-being “It (the building) is a sense of security.”</td>
<td>Well-being “She visited all the middle schools in the city. Here she felt safe.”</td>
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