The Open House International Association (OHIA) aims to communicate, disseminate and exchange housing and planning information. The focus of this exchange is on tools, methods and processes which enable the various professional disciplines to understand the dynamics of housing and so contribute more effectively to it. To achieve its aims, the OHIA organizes and co-ordinates a number of activities which include the publication of a quarterly journal, and, in the near future, an international seminar and an annual competition.

The Association has the more general aim of seeking to improve the quality of built environment through encouraging a greater sharing of decision-making by ordinary people and to help develop the necessary institutional frameworks which will support the local initiatives of people in the building process.

International Seminar/Workshop

To be held annually and hosted by a member institute. Explores the many interlocking forms of public/private relationships which are emerging in housing and settlement development.

The competition

To be sponsored annually, in connection with the Seminar/Workshops, to provide a platform for exchange and development of the field of housing and planning.
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Abstract

The Millennium Development Goals and Agenda 21 objectives have generated international research initiatives in the emerging field of urban agriculture (UA) which are gaining preëminence. Linking development, food security, city planning, urban design, housing, and horticulture, UA includes the cultivation of plants, medicinal and aromatic herbs, fruit trees, and the raising of animals, poultry and fish to support the household economy, food processing and the commercialisation thereof—all within existing urban areas.

Recent research on the provisioning of cities, especially those not in the West, has highlighted the significance of UA in supplying local urban markets and for its positive contributions to socioeconomic and environmental wellbeing and to the quality of food. Empirical research has shown that urban and periurban food production now provision cities as culturally and geographically varied as the Cuban capital of Havana, with a daily average yield of 150 to 300g of herbs and vegetables per person; Shanghai, where UA provides the city with 60% of its vegetables and 90% of its eggs; and Brazzaville, Congo, where one-quarter of the city’s households provide 80% of the leafy vegetables consumed by the urban population.1

UA was identified as a key area for action for the first time in a UN forum following the 2005 Habitat JAM, and it was subsequently recognised as a key descriptor for the UN-HABITAT World Urban Forum III held in Vancouver in June 2006, where several of the contributors of this Open House International special issue presented their work. Since then, interest in UA has grown tremendously, especially because it can help develop local responses to the issues of sustainability in cities and climate change—two of the most pressing challenges of the 21st century.

This special issue entitled: Designing Edible Landscapes, explores different ways of permanently integrating productive agriculture into the fabric and social life of cities. To achieve this, landscapes must be seen in a comprehensive manner and they have to be designed well. The upcoming issue is driven by the need to show how and why Edible Landscapes can be included as strategic, sustainable, and multifunctional components of statutory municipal plans, urban design schemes, neighbourhood development projects, urban upgrading initiatives, and the design of housing. To this end, it includes multiple examples of where all of these have already been done. The special issue is organised around five themes: (1) The growing role of urban agriculture in cities; (2) Urban agriculture as an agent for urban design and urban upgrading; (3) Designing for urban food security; (4) Productive landscape design explorations; and (5) The cultural tradition of edible landscapes.

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A BRIGHT FUTURE FOR CREATING ENVIRONMENTS CONDUCIVE TO LEARNING

Whether in school buildings or university campuses, the educational process involves many activities that include knowledge acquisition and assimilation, testing students' motivation and academic performance, and faculty and teachers' productivity. The way in which we approach the planning, design, and our overall perception of learning environments makes powerful statements about how we view education; how educational buildings are designed tells us much about how teaching and learning activities occur. Concomitantly, how these activities are accommodated in a responsive educational environment is a critical issue that deserves special attention. While it was said several decades ago that a good teacher can teach anywhere, a growing body of knowledge-derived from knowledge on "evidence-based design" suggests a direct correlation between the physical aspects of the learning environment, teaching processes, and learning outcomes. In its commitment to introduce timely and pressing issues on built environment research, Open House International presents this special edition to debate and reflect on current discourses on sustainable learning environments.

As a guest editor of this edition, my personal interest, acquaintance, and experience of learning environments come primarily from working with Henry Sanoff in the early nineties on a research project-funded by the National Endowment for the Arts and conducted at the School of Architecture at North Carolina State University-addressing environments for young children, in which a number of collaborative mechanisms for understanding and anatomizing the learning environment are developed, while exploring the wide variety of needs and interests that are mandated by different user types (Sanoff, 1994, 1995, 2002). Such an experience was enhanced by my involvement with Adams Group Architects in Charlotte, North Carolina in a research and consultancy capacity during the period between 2001 and 2004 (Salama and Adams 2003 a. and b., Salama, 2004, Salama, 2007). Several strategic planning projects, pre-design studies, and participatory programming and design were developed for schools in North Carolina.

A worldwide commitment to designing responsive environments conducive to learning is witnessed in many academic settings. This is evident in a recent colloquium conducted by Colloquia of Lausanne, Switzerland, and in the recent efforts by recent practices in both developing and developed countries (Knapp, Noschis, and Pasalar, 2007). Notably, in many schools of architecture the subject is being debated through research and design where future generations of architects are exploring possibilities of shaping the future of learning environments. An important example among many others is the studio project undertaken at the Post Graduate Level at Queen's University Belfast and coordinated by Alan M. Jones. In this project and through designing a context-based high school in Belfast, students are developing a deeper insight into the understanding of sustainable design parameters including lighting experience and the distinctive characteristics of the spatial environment and its impact on learning.

The trans-disciplinary nature of contemporary architectural knowledge and its epistemological foundations is now palpable in most architectural discourses. Discussing and debating learning environments is no exception. The papers of this issue manifest the trans-disciplinary paradigm where knowledge about learning environments crosses the boundaries of disciplines including pedagogy, psychology, behavioral sciences, planning, and design. Remarkably, reference to the work of scientists and education theorists is so obvious in the work presented (Dewey, 1916, 1933; Friere, 1971; Kolb, 1976, 1981, Kolb and Kolb 2005; Gardner, 1983; Edwards and Usher, 2001; and Stevenson, 2008).

The twelve papers included in this issue explore and investigate qualities and characteristics of learning environments at different scales and in different contexts, from classroom typologies to campus outdoor spaces. They place emphasis on emerging paradigms in learning environments that involve a number of underlying issues including the academic house clustering, the school as heart of the community, the rising interest in new classroom spaces and forms, the user-centered processes, utilizing the learning environment as an open textbook, and the impact of recent advances in information technologies and globalization on the future of learning settings.

Categorizing the papers, it is noted that five papers focus on learning settings in schools and the processes by which those setting are created, while four papers introduce human centered issues that pertain to university campuses, exemplified by users' perception, socio-cultural norms, and behavioral factors. On the other hand, three papers focus on the spatial environment of the design studio as a unique place for making design decisions. Shared among most papers in this issue are two important aspects, collaboration in planning and design decision making and a continu-
ous focus on the users of the learning environment whether in design, evaluation, or the actual use.

In his paper Research-Based Design of an Elementary School based on his over thirty years of dedication to collaborative and community design, Henry Sanoff introduces an important recent case. He examines learning and teaching styles in a collaborative process that encompasses participatory pre-design, selection of alternatives based on learning and teaching approaches, and post occupancy evaluation. This is a form of evidence-based design, where students, teachers, and parents participate with the design team in making decisions about their future school. Such a collaborative process resulted in a new innovative approach to designing the learning environment including an "L" shape classroom, outdoor classrooms, the academic house and courtyard concepts. An ethical approach showing the commitment of the design team to explore the results of their collaborative process is envisioned through a post occupancy evaluation study.

Strikingly, many of the features included in Henry Sanoff's approach are debated in other papers within this issue. The ideas of academic house and courtyard to promote ecological awareness are elaborated in the work of Clare Newton, Sue Wilks and Dominique Hes. Their paper places emphasis on the fact that schools are complex systems and therefore argue for conceiving them as teaching tools. Newton, Wilks, and Hes base their work on three elements that include spaces that support effective learning, the role of the building in achieving sustainability, and the pedagogies and practices by which the first two are achieved.

The work of Ashraf Salama builds on Sanoff's collaborative approach and examines the learning environment in both research and design processes. This is based on Salama's involvement with Sanoff and the Adams Groups Architects in working with the school community to identify their needs, wants and aspirations, while exploring the pedagogical aspects by which their targets are met. The results of his investigation support the assumption on how the school environment has a direct impact on the way in which teaching and learning takes place. He concludes with an argument discussing the need for going beyond adopting prescriptive measures to address the quality of the learning environment; this is conceived by highlighting the need to utilize knowledge generated from research findings into school design process, to pursue active roles in sensitizing users about the value of the school environment in reaching the desired academic performance while increasing teachers' productivity.

The collaborative approach is evident in the work of Iris Aravot. In her paper, she introduces an argument for creating learning environments that are context-based and locally focused, signifying identity, belonging and wellbeing. In a poetic yet critical analysis, she proposes an approach to the creation of learning environments through the intertwining of topographies - the owned and continual space of everyday life and dwelling; shrines - the spaces for the new, the exalted, the non habitual; and making by the community - the continual collaboration of the community in the design and re-design of their learning environment. It is noted that Aravot utilizes a phenomenological approach drawing from a body of knowledge generated from a wide spectrum of theoretical and scientific sources coupled with her experience as a designer.

Based on the work of an interdisciplinary team, Pamela Harwood presents ten patterns underlying crucial imperatives and principles for designing learning environments. However, a focus on Charter schools is the major driver of her work. Harwood's team involved students in architecture, urban planning, business, education, and psychology. The focus on Charter schools within the United States is based on the fact that they have innovative curriculum, administrative and pedagogical autonomy, while challenging traditional methods adopted by public education. Addressing the connections between the designed physical environment and the learning innovations it supports, this work fosters the vision and mission of Charter schools. It emphasizes a considerable number of sustainable design parameters that include renovation, adaptive reuse, and non-traditional use of existing buildings, efficiently maximizing student safety and learning, and adhering to best-practice standards of ecological design.

At different scales university learning settings are addressed in the works of Joy Potthoff, Yasser Mahgoub, Susan Whitmer, and Ashraf Salama. Based on an intensive post occupancy evaluation process, Potthoff presents an assessment study that examines faculty and student satisfaction with classrooms in a recently built university building. While the satisfaction level of both faculty and students were high, concerns were expressed in terms of comfort levels and room temperature, equipment use, and controlling the indoor environment.

Three studies related to the larger context of the university environment are covered. Yasser Mahgoub utilizes the case of the New Kuwait University City to demonstrate the way in which socio-cultural requirements impact campus design. The premise in the context of Mahgoub's work is that addressing socio-cultural factors does
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not necessarily go along the development of ecological based sustainable environment. He focuses on two major factors that support such a premise: separation of students' sexes and car parking requirements, and presents them as challenging aspects for achieving the minimum level of sustainability.

In his exploration of the issue of good design intentions versus users' reactions, Ashraf Salama introduces a multilayered methodology for the assessment of the performance of Qatar University campus outdoor spaces from users' perspective. Such a methodology involves walk-through evaluations and direct observation, behavioral mapping, and survey questionnaires. He juxtaposes the statements made by the architect and the results of his assessment which reveals several contradictions between the "good intentions" and users' responses. He concludes that by recognizing how well university campus outdoor spaces respond to the needs of faculty, students, and staff, it is possible to recommend mechanisms for improving the outdoor environment necessary to facilitate the work and learning experiences of different users within the campus and the desired student-faculty interaction.

In a completely different context, Susan Whitmer examines the role of place in three university campuses in the United States as it relates to students with learning disabilities. Focusing on three important elements fundamental to successful learning environments, Whitmer places emphasis on wayfinding, formal learning spaces, and disability learning spaces. Her research concludes by arguing for the crucial need for going beyond addressing the minimum planning and design standards, while effectively incorporating universal design principles.

The three papers that focus on the learning settings of the architectural design studio present good examples that relate learning in architecture to the timely issues of experiential learning, information technologies, and globalization. Adopting the experiential learning model introduced to the world of pedagogy by David Kolb, Pedro Serrano Rodríguez and Luis Felipe González Böhme explore the use of outdoor workspaces as catalysts for generating and testing design ideas. They base their work on the typical norm of disassociating indoor and outdoor learning experiences. Presenting cases from the experimental studios they are currently undertaking at the Universidad Técnica Federico Santa María in Chile, Rodríguez and Böhme argue for an effective incorporation of outdoor learning which is integral to a studio culture.

Juxtaposing the physical environment with advances in telecommunication technologies, Burcu Senyapili and Ahmet Fatih Karakaya investigate the impact of virtual learning environments on the future typology of studio settings. Based on their investigation, Senyapili and Karakaya propose the use of a hybrid setting for the future setting of studio environment predicting that such a setting will be a learning environment that integrates the physical and the virtual worlds. In a different but related juxtaposition, Michael Jenson argues and debates the issue of globalization through the studio environment. He introduces the notion of learning across the boundaries of cultures and regions, exploring the concept of de-territorialization to emphasize that within this concept, cultural spaces are not necessarily bound to geographical areas. What is juxtaposed in this context is the global versus the local. Taking the discourse further Jenson argues that the old lecture hall and studio configuration must together manifest the new learning environments.

While exhibiting different types of commitment to the creation of responsive and inclusive learning environments amenable to creativity and innovation, the twelve papers advance the discussion on the characteristics and parameters of the future of learning environments while at the same time paves the road to continuously questioning norms and practices that ultimately foster the creation of environments conducive to learning.

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INTRODUCTION

Faith in the collective capacity of people to create possibilities and resolve problems is a centerpiece of a democratic system. Not only do people have the right to participate in making the decisions that will affect them, but also their participation will improve the effectiveness of the decision-making process (Sanoff, 2002). A democratic design process in this context would mean having schools planned by people who will use them, including educators, parents, students, citizens, and members of civic and business organizations.

Educators are beginning to realize that without the support and engagement of parents and community leaders at the local level, any attempts at improving the public schools will ultimately be ineffective. Engagement is when parents and community members collaborate in pursuing their own values and visions for their children’s future. Parent engagement is more than volunteering their time for school activities. They initiate action, collaborating with educators to implement ideas for reform. Schools provide the place where people of different backgrounds interact with one another, to listen, to share concerns, to debate and deliberate. Parents and community members can initiate conversations that go beyond the discussion of surface problems and complaints.

Through these conversations, people develop the trust and consensus needed for action (Cortes, 1995). Other research has shown that parent involvement in schools leads to improved student achievement, reduced absenteeism, decreased delinquency, and reduced dropouts (Howley, 2001). As school buildings and classrooms become more welcoming, parent volunteerism will change and increase from attending periodic Parent-Teachers Association (PTA) meetings to active participation.

In education, as in other institutional systems, decisions about school facilities tend to be made by a few people who are not direct building users, often ignoring the direct involvement of teachers and students. Involving a building committee alone does not always solve the problem of gaining school wide support for the project once the design work is completed. Only a process that allows for face-to-face contact between users and those who influence the decisions can result in a sense of ownership in the process and project.

Personal contact between school leaders,
teachers, staff, and students in an organized school planning process can result in considerable savings in time and money, since it provides more relevant information more quickly and efficiently than was possible before. Arguments persist that a participatory process requires more of an architect's time and consequently would result in higher costs. Nothing could be further from the truth. Actually, direct participation through intensive workshops requires less time than conventional methods normally used by architects. Involving all participants in a planning workshop is more efficient than relying on information gathered in a piecemeal fashion over long periods of time.

When community members become a part of a visioning process they are more willing to work together to set goals, solve problems, and, ultimately, provide their schools with the kind of ongoing support necessary to make them successful (Sanoff, 2002). At the same time, a re-examination of traditional design and planning procedures is required to ensure that participation becomes more than confirmation of a professional's original intentions (Henry, 2000).

**BENEFITS OF COMMUNITY PARTICIPATION**

A strong facility planning process can reap benefits beyond a pleasant environment. School and community pride as well as faculty morale are raised when the facility planning process involves the right questions, the right stakeholders, and a clear sense of purpose (Copa and Sutton, 2001).

For decades, educational leaders discussed the components of a successful educational program, yet they have regarded the physical setting as an institutional backdrop receiving scant attention. Widespread misconceptions reinforce the view that the quality of the school building has no impact on academic performance. Consequently, a gap exists between the educators’ view of improving quality and the process of planning schools. Current learning styles and teaching methods suggest the need for a new form of learning environment characterized by different activity settings and small-group activities (Lackney, 2000). To obtain and maintain educational quality, however, requires changes in the facility planning process.

One hundred and fifty years ago, classrooms represented a common teaching method. Today teaching methods have changed, but, often, the design of the classroom has remained static. An examination of current learning styles and teaching methods suggests a new form of learning environment characterized by different activity settings and small-group activities.

In order to experience healthy development, students require certain needs to be met. Schoolagers require diversity, which entails different opportunities for learning and different relationships with a variety of people (Levin and Nolan, 2000). In a school that responds to its students' need for diversity, one would not find students all doing the same thing, at the same time, in similar rooms. One would not expect to see students sitting in neat rows of desks, all facing teachers who are lecturing or reading from textbooks. Instead, in responsive schools, students and teachers would be engaged in different learning activities in and out of the classroom. A variety of teaching methods including small group work, lectures, learning by doing, individualized assignments, and learning centers, would be used (Jacobs, 1999).

Teachers are much more influenced by the physical environment than they realize. Malcolm Seabourne, a historian of school building in England suggests that the building made the teaching method. The separate classroom was a sign that teachers were trusted to be independent and had greater privacy. The classroom was designed and built to represent and shape a particular form of teaching behavior. The way a school is designed to work reflects social ideas about institutions and the education these institutions are created to further (Grovenor, Lawn, and Rousmaniere, 1999).

The shape of spaces, furniture arrangements, and signs are physical cues that transmit silent messages, and both teachers and students will respond. These environmental messages stimulate movement, call attention to some things, but not others, encourage involvement, and invite students to hurry or move calmly. This environmental influence is continuous, and how well it communicates with the users will depend on how well the environment is planned. Classroom arrangement is not a mere technicality, or a part of the teacher's style. It reflects assumptions about the teaching-learning process and its outcomes.

The usual classroom seating arrangement of rows headed by a teacher at the front usually assumes that all information comes from the teacher. This arrangement assumes a teacher-centered classroom where the learning process depends upon the teacher's direction. Considering
the new thinking about how students learn, Halstead (1992) envisioned the classroom of tomorrow where classrooms will be like studios where students will have their own workspace. In addition, there would be workspaces for cooperative learning by groups of different sizes, quiet private areas for one-on-one sessions, and places where students can work independently. Teachers need to learn how to question the classroom setting in a constructive way, looking for solutions and feeling in control over changeable features. Taking control would permit the teacher to experiment with classroom modifications to determine what works and what does not work, since each teacher and each group of students will be different. The ability for teachers to control the classroom environment leads to feelings of accomplishment and independence, whereas a lack of control may result in helplessness. Awareness can make a teacher sensitive to subtle aspects of the environment and bring to light the adverse effects of a poorly organized environment. The goal in developing classroom awareness is to reach a new understanding of how the environment supports students’ activities and nurtures their development.

Although transaction theories of student/teacher participatory interaction have been discussed in the educational literature for decades (Dewey, 1916; Friere, 1970; Krebs, 1982), more recently there is research describing a correlation between student-teacher participatory interaction (STPI) and student motivation to participate (SMP) in the classroom (Dormody and Sutphin, 1991; Skinner and Belmont, 1993). Similarly, if students
experience the classroom as a supportive place where there is a sense of belonging, they will tend to participate more fully in the process of learning (Brophy, 1987). The idea of personalized learning environments, which has generated immense interest in the design of classroom clusters, house plans, and school-within-school settings, has magnified the role student commons can play in a school’s overall design, serving as a hub for an academic wing or providing a space for alternative teaching strategies.

The following case study illustrates several methods of engaging students, teachers, parents and the school board members in the design process.

**GIBSONVILLE CASE STUDY**

The new Gibsonville Elementary School, located in Guilford County, North Carolina is the result of a county-wide school bond, which provided funds for the replacement of a partially condemned historic main building and several small deteriorating classroom buildings. Guilford County school officials selected The Adams Group Architects, Sharon Graeber and Henry Sanoff due to their previous experience of engaging the school community in the design process. At the first teacher/architect/client introductory meeting, teachers expressed the desire to achieve a small intimate scale in their new school. The new 750-student school will include pre-kindergarten through 5th grade classrooms.

The initial step in the design process aimed at identifying students and teachers ideas regarding key features of the new school. By completing the phrase, I wish my school; a summary of students’ desires included a colorful environment, extensive use of the outdoors and garden areas, while the teachers were concerned about space for learning centers, space for tutors, and an environment that was open and inviting.

Because the most important element of the school was the classroom, a workshop conducted by the architects focused on classroom design. The teachers who attended were provided with drawings of six different classroom arrangements developed from a study of classrooms by the design team, with each arrangement drawn at the same scale (Figure 1). Teachers were organized into four-person groups to encourage discussion and idea sharing and evaluated the classroom arrangements (Figure 2). They identified those classroom arrangements allowing for a variety of learning opportunities, the best arrangement for a variety of teaching methods, variations in seating arrangements, teachers ability to move around and interact with students, and offering a sense of belonging.

After considerable discussion, the teachers selected the “L-shape” classroom arrangement as providing the most flexibility in managing space and setting up learning centers. The L-shape was also judged best for allowing a variety of teaching methods, including team teaching, and encouraging small groups to work independently. Teachers agreed that the “L” shape, because of its geometry encourages higher teacher movement than more traditional classroom shapes. Increased teacher movement in the classroom results in more teacher-student contact and consequently a more positive student attitude towards school, which can lead to enhanced learning.

A second workshop focused on the location of the new school on the 20-acre site, particularly since students as well as members of the community used an existing gymnasium. Access to the gymnasium, existing traffic patterns and the use of existing nature trails suggested several possible building locations. Based on discussions with the teachers three alternative site plans were developed whereby teachers rated each according to such criteria as the preservation of the condemned but historically significant existing school building, preservation of the trees and natural site conditions, safe traffic patterns and building entrance visibility.

**Design Goals**

The overall plan consists of five “L” shaped classroom clusters, each containing its own open courtyard (Figure 3). The design features aimed at
enhancing learning resulted from the participation of students, teachers, and parents in the design process. The classroom, which is the basic unit of the school, was viewed as a place where students could work in groups, and engage in different activities simultaneously. Consequently, earning centers became the focal point of the classroom in an "L" shaped geometry. At the teachers' request, the traditional workrooms were replaced by tutoring spaces between classrooms to accommodate small groups of students to work on projects or to engage in peer tutoring.

Another critical design feature is direct access from each classroom to the outdoors allowing teachers to create outdoor classrooms that could enhance students' ecological awareness (Figure 4). The central courtyard in each classroom cluster is also seen as a teaching/learning environ-
ment. The limited budget did not permit for the development of the courtyards or the outdoor classrooms, however, during the workshops it was agreed that the Parent-Teachers Association would take the lead in developing the courtyards, while the teachers and students would develop their respective outdoor classroom.

During the design development and construction documents phase of the project a building committee representing teachers, school officials, construction management and the school board monitored the process through the completed construction of the building in December 2006. Several months after the initial move-in, a courtyard planning workshop engaged the teachers in a discussion of variations in courtyard themes and how they could be integrated into the curriculum. Theme images were developed such as a rainforest (Figure 5) or natives plants (Figure 6) as well as funding approaches that parents and teachers could explore to implement their ideas.

Post Occupancy Evaluation
After six months of occupancy a post occupancy evaluation (POE) of the completed building was conducted. The intent was to identify major successes and failures. A seven-point Likert school building rating scale, which was administered to all the teaching staff, focused on overall building performance, which included physical features, outdoor areas, learning environments, social areas, media access, safety and security, and visual appearance. An analysis of the results using descriptive statistics revealed a high degree of satisfaction in most categories. Teachers gave a high satisfaction rating to the visual appearance of the buildings’ interior and exterior (7:44 & 7:45). Outdoor learning (7:13) and play areas (7:10),
media and technology access (7:36), safety and security (7:49 & 50) also received very high ratings of satisfaction. Since the courtyards were not landscaped at the time of the POE, teachers expressed their disappointment (7:8 & 7:9). In a discussion following the survey results a surprising dissatisfaction voiced by the teachers was the unfinished appearance of the building interior (Figure 7). The building design intentionally revealed the construction and utilities system to allow the building to be a learning environment for the students, an approach that has been successfully employed in "green school" design solutions.

A follow-up workshop focused on classroom layout, since the principal observed that teachers did not organize their classrooms efficiently. The strategy for this workshop was to assemble the teachers to observe different arrangements proposed by the architects (Figure 8). When an agreeable arrangement was developed all teachers were provided with plan drawings of the furniture layout that they could implement. As the teachers adjust to their new environment it is likely that they will discover features of the building that could enhance the education program (Figure 9), since the development of the school building is an ongoing process. Parents and teachers are currently engaged in fund raising to complete the outdoor areas, which will include involving local artists and landscape architects.

**CONCLUSION**

Participation in school and community issues places serious demands and responsibilities upon participants. Although people voluntarily organize to participate in community projects, the technical complexity of such projects usually requires professional assistance. In addition to the need to address technical complexity, sound design and planning principles must be incorporated in the school design process. Without guidance, community groups may respond only to situations of crisis and may not achieve the goals that originally united them. The management of participatory efforts is important.

Significant changes in people’s behavior will occur if the persons expected to change participate in deciding what the change shall be and how it shall be made. Good planning for community participation requires careful analysis. Although it is critical to examine goals and objectives in planning for participation, there are various techniques that are available, each of which performs different functions. In the last several decades, there have been numerous efforts to accumulate knowledge about various participation techniques, as well as the function that these techniques perform. Community surveys, review boards, advisory boards, task forces, neighborhood and community meetings, public hearings, public information programs, interactive cable TV, have all been used with varying degrees of success, depending on the effectiveness of the participation plan. Because community participation is a complex concept, it requires
considerable thought to prepare an effective participation program.

The key to providing school facilities that meet current and future needs in a given community is to constantly scan the environment, communicate regularly with educators, the community, businesses and policy makers, and stay aware of current educational, design, and environmental issues. Otherwise, reliance on "It's always worked in the past," or on "That's how it has always been done" may well result in the waste of capital resources, dissatisfaction in the community, and reduced opportunities to optimize instruction and educational outcomes.

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EDUCATIONAL BUILDINGS AS 3D TEXT BOOKS:
Linking ecological sustainability, pedagogy and space

Clare Newton, Sue Wilks & Dominique Hes

Abstract
This paper discusses the opportunity afforded by a substantial research grant to examine three aspects of recent school design and learning. First, spaces that support effective learning, second, the role of the building in achieving sustainability, and third, pedagogies and practices that support one and two. Schools are complex systems in which the physical environment interacts with pedagogical, socio-cultural, curricular, motivational and socio-economic factors as well as providing benefits or costs in environmental terms. Limiting the research focus to exemplar case study schools will enable a more comprehensive study of the schools as 3D texts. Through proactive research methodologies, students, teachers and architects will collaborate to manipulate the spaces to suit different learning modalities. Students will help collect environmental data and therefore learn more about climate and energy. They will also participate within teams to further their problem solving, communication and organizational skills. Teachers will become more aware of and hopefully skilled at managing space both environmentally and pedagogically. Architects will have the unusual opportunity of experiencing and analyzing their designs through the eyes of users. While this ambitious research is in its infancy, the interdisciplinary approach and support from nine industry partners is relevant for other researchers who are seeking to have an impact on design practice using an action research methodology. The research is timely. Following in the footsteps of the United Kingdom, Australian state and federal governments have committed to reinvigorate our aging school stock. This research led by an interdisciplinary team, was developed in partnership with Department of Education and Early Childhood Development, the Victorian Government Architect's Office, and seven design firms with expertise in learning environments. The research has been funded by the Australian Research Council.

Keywords: Smart Green Schools, Spatial Literacy, Sustainable Schools, Learning Environments, Pedagogy And Space.

CONTEXT
A substantial part of the school building stock within Australia needs replacement or refurbishment. Embodied energy, environmental impacts, operating costs and life-cycle issues demand cost-effective decisions. To some extent, the Australian Federal and State Governments are following in the footsteps of the United Kingdom by committing to a broad renewal and reinvigoration of school environments. In the 2008 Australian National Government Budget $1.7 billion was committed over four years to maintain, upgrade and replace school infrastructure. An additional $481 million has been committed to the Solar Schools Program (Gillard, 2008). In addition, the Victorian State Government has promised to rebuild or refurbish every school by 2017 through the investment in new school technology and the building of 200 science rooms. It is the largest investment in the history of state education (Education Services Minister, 2007).

Environmental imperatives and the rapid pace at which the virtual world is pervading and enriching student learning both require appropriate design responses. Contemporary curriculum guides are requiring educational settings to change from a traditional classroom configuration into learning and information environments (Oliver and Lippmann, 2007). Every Australian state is facing similar educational imperatives - investment in schools, change in learning approaches, student retention rates, learning modalities to suit multiple intelligences, engaging reluctant learners, etc. If we do not bring environmental and educational imperatives together in innovative ways, then embodied energy costs and government funds will be wasted on buildings that do not last.

In 2007, the research proposal described in this paper won an Australian Research Council Linkage Grant enabling five academics to collaborate with nine partners from industry. The research...
is unusual in that it sits at the intersection of education and architecture. The Chief Investigators come from the diverse fields of architecture, sustainability, education, facility management, and urban design. The Grant is also funding an educator and architect to undertake postgraduate studies.

EDUCATIONAL SPACES AS 3D TEXTS

It is important to state that teachers in Australia have not been trained to recognise the importance of the environment as a key part of their overall thinking and practice. We believe that the built environment needs to be understood by teachers as having a significant role in educational outcomes. The underlying question for us is how the learning environment impacts on the users. This cannot be understood simply as architectural determinism where the space enables and controls the activities within. Relationships between people and their settings are complex and likely to result from involved chains of events. The defining and understanding these chains of events are the key reasons for using action research methodologies within case study schools.

The engagement of middle years' students is a focus of this research. School students will help collect environmental data associated with the school and learn more about climate and energy. In this proactive research methodology, students, teachers and architects will collaborate to manipulate the curriculum and learning spaces to suit different learning modalities. Students will participate within teams to further their problem solving, communication and organisational skills. Teachers will learn to manage space both environmentally and pedagogically. Partner architects will have the unusual opportunity of experiencing and critiquing their designs through the eyes of users.

Middle school students from Years 5 to 8 (approximately ten to fourteen years of age) were, until recently, largely absent from educational discourse in comparison with the early years of school or the at-risk students from Year 9 and above. Middle school students are ideal as active participants within this research. They are beginning to understand issues to do with science and design and the curriculum is flexible enough to support authentic learning experiences such of the type proposed. As students progress towards the exit examinations, there is less flexibility to adapt the curriculum.

SPACE AND LEARNING

Research into the relationships between space and learning is beginning to gain momentum after an 'absence of concern' for 25 years or so during which educational discourse has tended to ignore schools as physical entities (Jamieson et al., 2000). After the post-war 'golden age' years in which school buildings were discussed particularly concerning open planning, the physical environment has been largely ignored in favour of research into pedagogical and social contexts.

Evidence correlates shabby environments with negative impacts on students and teachers (Schneider, 2002; Young, 2003; Hallam, 1995). This body of research has controlled variables to show that building condition alone impacts on student test scores (National Research Council, 2006; 4-7). What is less clear is whether the physical school needs to be anything more than adequate. Some researchers argue that good learning outcomes can be achieved despite unpromising environments (Earthman, 2004; Rutter, 1979). Strichet did not find that student performance rose when facilities go from acceptable to excellent although he did accept that achievement lagged in shabby buildings (2000). The issues are complex.

Secondary School Heads strongly correlated the physical environment with pupil motivation while Primary Heads perceived younger students to be more motivated by teachers (Clark, 2002; 11).

Evaluation of recent research by Higgins et al (2005) suggests that benefits from changes have less to do with the specific element chosen and more to do with how the process of change is managed. This indicates a strong link between effective engagement with all building users and the success of the environmental changes: "School designs cannot be imposed nor bought off-the-shelf. Success lies in users being able to articulate a distinctive vision for their school and then working with designers and architects to create integrated solutions" (Higgins et al., 2005: 3).

Up-to-date information is necessary to understand the context in which school design is occurring and undergoing rapid change. Today's students are natives in a world of information technology. They are adept at learning using digital media. Schools are shifting from teaching institutions to learning organizations with new curriculum models encouraging increased connectivity between students and their local and global environments. In particular, knowledge is increasingly
being constructed across disciplines rather than within the traditional subject ‘silos’, necessitating a rethinking of how space can support this interaction (Gibbons et al., 1994).

SUSTAINABILITY PERFORMANCE AND LEARNING

Research indicates that teachers do not perceive the physical environment as a major indicator of educational outcomes and are therefore unlikely to fully explore the potential of the environment as a 3D textbook to facilitate learning (Nair and Fielding, 2005). Yet having buildings that perform well (or poorly) in terms of environmental impact offers a perfect opportunity to use the building as a teaching tool. Clark (2002: 1) quotes Berner as saying that for a society searching for ways to address the educational needs of the future, the building itself is a good start. Our research aims to make recommendations on how spatial and environmental considerations might be better embedded into teacher education and school management training.

Environmental sustainability issues are related to schools in two ways: impact of the school on the environment and the impact of the environment on schools. Schools can minimise their impact on the environment by strategies applied to green buildings in general: energy, water and waste efficiency, materials selection, design for durability, flexibility and minimisation of ongoing maintenance. Within green building based on temperate areas (in this case Melbourne and Sydney), it is possible to reduce the amount of energy consumed by 70% or more through good envelope and lighting design (see projects such as Council House 2 and 40 Albert Road in Melbourne, Australia). Water can be reduced by 80-90% (Chanan et al., 2003) if efficiency is optimised, rainwater is collected and water reused. Waste in construction and renovation can be virtually eliminated (DEWR, 2007), and waste in operation can be reduced by 60% or more. Materials can be selected that are renewable, reusable and recyclable and together with design for durability, flexibility and maintenance minimisation can reduce the impact of the embodied environmental impact significantly. Spaces need to be designed to suit the local climate but can also support the wellbeing of occupants and their ability to teach and learn. Both the way the building has been designed and how it responds to its environ-
ment can be used in teaching.

In the 1990s a substantial focus on the Middle Years of schooling (Hill and Russell, 1999) led to revised curriculum documents that called for engagement of students and interdisciplinary teaching approaches. This represents substantial change for the majority of practicing teachers. In our case study there may be instances where new spaces have been designed and built but are not being used to advantage because teachers have not adopted progressive pedagogies.

Following their experience with the professional development of teachers, MacDonald and Hagan (1996) described the characteristics behind change - or resistance to change - in a secondary school setting. The research team will need to keep them uppermost in their minds as they work to bring about what will be substantial change. According to MacDonald and Hagan, initiatives that involve changes in how people teach (as distinct from what they teach) require volunteers who get involved because of existing concerns about their own practice. Hopefully our interaction with the teachers-as-users after our initial observations will achieve this. Change is not easy because teachers’ professional practice has evolved for good reasons and new approaches may be viewed as risky. Rather than change being attempted by individuals, it will be necessary to build into any program we design the participants’ sense of shared ownership.

It is important to stress that reforms focused on learning environments, and the pedagogies and changing technologies employed within these spaces, may lead to substantial improvements in students’ educational experience. We are hoping that the transformation of educational spaces may prove to be an important ally for middle school curriculum reform.

MODERN PEDAGOGIES AND TECHNOLOGIES NEED MODERN SPACES

Rather than trying to implement new pedagogies and innovative technologies into traditional spaces, appropriate learning spaces are required, spaces that accommodate multiple forms of communication. Many existing school buildings were built around transmission models of teaching with the teacher and black/white board at the front of the class and information and discussion teacher-centred. These spaces were designed for students to passively receive information. Spaces that enable engagement with knowledge in active, flexible ways are required. For example, new understandings can be developed via tasks that require interpersonal relationships and experiential activities. Thompson suggests that “in keeping with best practice, and subject to cost constraints, school and classroom infrastructure require updating to create learning centres grouped by type of activity” and advocates “creating workspaces for specific tasks … such as face-to-face lessons, class meetings, planning group-work, carrying out group-work, distance learning, and self-paced or individual work” (Thompson, 2005: 252).

PLANNING AND DESIGN CONSIDERATIONS FOR MIDDLE SCHOOL BUILDINGS

When catering for the new pedagogies, spaces that accommodate for both physical and social interaction are required. Middle school learning spaces require flexible environments in which students and teachers work together “for the acquisition of knowledge, the creation of conceptual understandings, and the development of skills” (Cleveland, 2008). Planning these spaces requires designers’ to consider ways of integrating the new technologies and flexible spaces and facilitate communication and a wide range of activities. Access to computers is a key requirement for project- and problem-based inquiry learning which operate around student-student, student groups and teacher-student or teacher-small group interaction. Computers should therefore be available in a range of settings that encourage communication, thus becoming an integral part of classroom interaction. Appropriately designed spaces will allow activities and students to flow from one space or social setting to another.

Change?

Further evidence that learning spaces specifically designed to enable progressive pedagogies are advantageous may be required prior to teachers commit to changing spaces and pedagogies. Fisher, as far back as 2004 was suggesting that, teachers in all educational sectors will continue to resist change and revert to the time-tested concept of the classroom unless it can be demonstrated that the physical learning environment can influence learning outcomes … There has been no sustained attempt at a holis-
tic change to approaches to educational reform that integrates all the forces acting on it and especially including the power of space (2004:37).

He found that although the impact of the physical environment and changes in technologies on learning had led to hundreds of studies of educational architecture, most were quantitative. These studies attempted to link test scores with conditions of school buildings paying little attention to the perceptions of students and teachers about their environment (2004).

Currently the National College for School Leadership (NCSL) in the UK is supporting a Leading Sustainable Buildings Project focusing on establishing the skills and knowledge required by school leaders to lead sustainable building projects. Since its launch in 2006 there has been a focus on the potential of buildings to transform learning and how it can be done. It sees, as do we, a need for school leaders to understand the skills and knowledge required by them to build projects. The NCSL is not aware of any research from the UK or abroad around this topic.

SMART GREEN SCHOOLS

Over three years, a team of researchers from The University of Melbourne’s Architecture, Building and Planning faculty will firstly observe the use of newly designed spaces in several schools and then interact with the users. A team of practicing architects and sustainable built environment experts already involved in the design and building of new schools is advising and assisting the project. The research interventions continue to evolve with input from the industry research partners and as the postgraduate students refine their research approach.

The Smart Green Schools research team will concentrate its research on Years 5-9 classes (i.e. approximately 10 to 15 year old students). The first stage will comprise the researchers, as ethnographers, observing students and their teachers using newly designed spaces. Teachers will then be interviewed to ascertain their perceptions of what is occurring in the spaces in relation to their uptake of the newly released Essential Learnings curriculum documents (Victorian Curriculum and Assessment Authority, 2005).

At a later stage, professional development modules connected with spatial awareness and...
developing an architectural sense will be conducted in the case study schools. Models of integrated curricula that bridge for example history, geography, maths, science and environmental studies will be designed and conducted in the schools. Further, both teachers and students will be assisted by the team to integrate the measurement of energy levels etc into their curricula.

The school environment is understood to be just one aspect of an interrelated system of cultural, economic, pedagogical, organizational and motivational factors. This research will later use students as the focus, and make recommendations on how environmental considerations might be better embedded into teacher education and school management training. With their teachers, students will collect environmental data and therefore learn about climate and energy. In this proactive research methodology, students, teachers and architects will collaborate to manipulate the spaces to suit different learning modalities.

An added benefit of this research will be that students will participate within teams of adults and peers to problem solve using the building as a 3D text. The concept of the 3D textbook is not new to designers. For example Nair and Fielding (2005) have written on the potential for the building to be part of the learning experience. However, it is a foreign concept to many teachers. The idea of the buildings as a 3D textbook, in relation to sustainability, is that if you design a building to be more environmentally responsible then why not use it as part of a curriculum to teach students about heating and cooling, temperature transfer, sun angles, lighting and so forth. Further, as a 3D textbook the building can embody its philosophy overtly, hanging its green credentials on its sleeve, with access to electricity meters, control mechanisms, data, and sustainability philosophies etc.

The use of vocabulary associated with sustainability and measurement of climactic conditions (eg ventilation, comfort, temperature etc) is becoming more commonplace in teaching and general use. However, it may surprise some that other vocabulary not commonly used or encouraged by teachers is that which may be described as "architectural elements", for example: shape, furnishings, entrances and exits, layout/flow pattern, landscape, symbols, use of empty space/in-between places, dimensions, relation to other buildings, site, lighting, materials, ventilation, function, signage, acoustics, designer, user (Wolf and Balick, 1999).

In order to adopt a progressive model for middle schooling that is aligned with the information age there remains a significant need for school buildings to be designed, or modified, specifically to support progressive pedagogies and the appropriate integration of technology. In order for whole school reform to occur, school leaders and educators will need to view the immersion of teachers in progressive pedagogies as a priority. This entails a move away from traditional classroom environments and the recognition that the new technologies, school building designs, educational philoso-
Conclusions

The learning environment is a complex set of interrelated elements. Focusing on quantitative outcomes by necessity limits the breadth of investigation. The researchers have chosen a qualitative framework in which some quantitative data is mined to enable the investigation of progressive learning spaces and the resultant perceptions of the users of these spaces, the students and teachers.

School buildings embody our society’s attitude to youth and education. They are a significant community asset. Through workshops between architects, teachers and students, we anticipate stakeholders becoming more skilled in managing learning spaces both environmentally and pedagogically. The researchers are working at the intersection of two communities of practice. The educators and students are learning to think about the implications of spatial design. In this project, architects will have the unusual opportunity of experiencing and critiquing their designs through the eyes of users. In the process, they are gaining knowledge about changing educational processes. The research is quickly gaining momentum. The partner meetings are providing an opportunity for educators and designers to discuss the obstacles and potential of implementing excellent learning environments. The authors have instigated undergraduate design studios around the theme of learning spaces. Further research projects have been instigated to expand the focus into the areas of prefabricated learning spaces, virtual learning spaces and the importance of outdoor play for learning.

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Design, Mary Featherston Design, Hayball, H2o Architects, McGauran Giannini Soon Architects, McBride Charles Ryan Architects and SBE Melbourne. Teacher, Ben Cleveland and architect Ken Woodman received postgraduate scholarships to research in the area as part of the funding.

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Design for Communication: Post-Occupancy Evaluation of Classroom Spaces

Joy Potthoff

Abstract
The purpose of this study was to examine faculty and student satisfaction with classrooms in a university teaching facility in the Midwest, U.S.A. The two-story, 95,000 square foot (79,429.5 square meter) building cost 13.5 million dollars to build and was dedicated for use by the entire campus with no college or department given permanent classroom space. The facility’s classrooms were designed to incorporate state-of-the-art communications technology including television monitors, DVD and video cassette recorders, overhead projectors and slide projectors, video presenters, and hook-ups for computers and CD, tape and other audio equipment. A post-occupancy evaluation (POE) survey of 125 faculty and 5,048 students using the facility indicated that the majority of faculty and students were satisfied with the classrooms (overall satisfaction: faculty, 65.3%; students 73.0%). However, problems were cited including: difficulty in using equipment, uncomfortable room temperatures and seating, and a sterile environment (all but three classrooms are windowless).

Keywords: Classroom, Design, Technology, Learning, Communication.

Introduction
The purpose of this study was to examine faculty and student satisfaction with classrooms in a teaching facility at a university in the Midwest, U.S.A. The two-story, 95,000 square foot (79,429.5 square meter) building cost 13.5 million dollars to build and is dedicated for use by the entire campus with no college or department given permanent classroom space. The 30 classrooms were designed to incorporate state-of-the-art communications technology to promote interactive teaching within the classroom.

The following literature review of the use of technology in the classroom highlights some of the thinking on this topic over the past two decades. Anthony Blackett, architect, and Brenda Stanfield, architect and interior designer, state that because of the increase in information sources, electronic technologies, and student/teacher collaboration, higher education needs to consider teaching spaces in a whole new way. They suggest that classrooms be designed for a full range of teaching modalities (small lecture, seminar, large lecture), and that facilities be planned for change and flexibility, as technology will change. They caution against gadgetry and being locked into one technology system. Blackett and Stanfield state that professors and students must be consulted to clearly understand their needs and "the planner's aim should be to help faculty teach and students learn--through improved modern classroom design" (Blackett A. & Stanfield B., 1994: 27).

E. Curtis Fawson (director for the Utah Education Technology Initiative in Salt Lake City, Utah) and D. Dean VanUitert (director of Media Services, Brigham Young University, Provo, Utah) reported on the work of a task force organized by the College of Education at Brigham Young University. The task force, established in 1989, was comprised of campus Media Services and the Department of Engineering. Their first job was to develop efficient methods of integrating teacher objectives, student learning outcomes, and technology into a total learning environment. A prototype classroom was designed, built, and tested. The overriding goal was "to provide a simple 'user friendly' control for a complex collection of equipment," and diminish faculty frustration in using the equipment (Fawson C. & VanUitert D., 1990:32).

In 2007 Steelcase, the international office furniture manufacturer built a prototype "LearnLab." The LearnLab design was based on the findings from several years of field research undertaken by the WorkSpace Futures Research Group. This initiative was driven by the over 15 billion dollar construction boom on college campuses throughout the United States. The Steelcase corporation is presently testing learning outcomes and teacher and student satisfaction with the LearnLab: "... so we can learn if
it sets the appropriate stage for the instructor and equips students with a learning environment that inspires collaboration” (Steelcase, 2006-a:2). The Steelcase Corporation further stated: “Yet if you take a look around many college campuses today, you’ll notice that the typical classroom remains a throwback to the past: desks lined up in precise order, a podium set in front, and a writing board bolted to the wall. Remove the occasional projector and the computer hook-up, and the classroom of 2007 looks pretty much the same as the 1957 model. . . . Many things have changed in education. New methods of instruction, new technology. But what hasn’t changed is the classroom, and that physical space gets in the way of more effective teaching and learning” (Steelcase, 2007:2).

Finally, the website DesignShare: Design for the Future of Learning (1998-2008) is a clearinghouse for innovative research and design for the built academic environment. The contributors to the website are dedicated to the creation of environments that facilitate the best learning and communication opportunities for students and teachers. The website showcases award winning, leading authorities in the field including Jeffrey Lackey (Lackey, 2000:1-2) and Prakash Nair, Henry Sanoff and Randall Fielding, editor of DesignShare’s Educational Specifications Forum (Nair P. et al., 2003:1-10).

In the university facility being evaluated, classrooms range in size from 600 square feet (55.74 square meter) to 3,600 square feet (334.44 square meter) and accommodate class sizes of 13 to 294 students. The amount of technical equipment is similar within each classroom and is controlled by the professor from a console located at the front of the room. Typically each classroom has a television monitor, DVD and video cassette recorder (VCR), overhead projector, outlets for a slide projector, and compact disc and tape decks. Also, a video "presenter" which allows the professor to show materials (photographs, actual objects) on
a large screen with the aid of a video camera, and a computer hook-up accessing the Internet, including the World Wide Web. Three classrooms (105, 107, and 113) are designed for teleconferencing using closed circuit television and a satellite link-up to transmit and receive information. (Please see photographs: small-sized classroom-Figure 1, Figure 2; medium-sized classroom-Figure 3, Figure 4; large-sized classroom-Figure 5, Figure 6.)

The walls in the classrooms are constructed of concrete block. Three walls in each classroom are painted light beige with a fourth accent wall painted either green/blue (turquoise), pink (salmon pink), or light yellow. The floor covering is either a blue/green/pink multi-weave low-loop carpet or a beige or green/blue multi-patterned 12-inch-square vinyl tile. In the tiered (stepped) floor classroom the seating is floor-attached and made of burgundy-colored molded plastic and beige painted metal. The tables in these rooms are floor-attached and have light beige laminate tops. The flat floor classrooms have free-standing beige molded plastic seating and chrome seating with attached writing tablets. All the ceilings are dropped with frame-suspended 20-inch square acoustical tile. Three classrooms (111, 115, and 117) have a mix of fluorescent and recessed incandescent lighting. All other rooms are illuminated by fluorescent lights with a dimmer switch. There are two styles of consoles. In the large classrooms, which have a projection room at the back of the room, the consoles are free-standing and rectangular in shape. In the smaller classrooms, the consoles are attached to the wall and peninsular in shape. Behind these consoles are built-in, tall corner cabinets for the electronic equipment. All of the consoles are room color-coordinated with laminate sides and light beige laminate tops. Each console area is provided with an ergonomic seat for the professor which is upholstered in burgundy-colored fabric with a gray plastic frame. All doors and trim are treated in light ash satin finished stained wood. (See Table 3 for matrix of the 26 classrooms).

The building was designed by a Midwestern architectural firm in collaboration with the university Architect's Office. The Office of the Vice President for Operations at the university sought input from faculty and students via a university committee. The committee surveyed department chairs and, in collaboration with the University's Architect's Office and the office of Capital Planning, submitted a 35-page program statement to the Vice President for Operations. After the program statement was submitted, little interaction occurred between the architects and the program committee during the design phase of the new facility. This is somewhat unusual as the "client," in this case the program committee comprised of faculty and students of the university, usually review the preliminary plans to check that program requirements have been satisfactorily met.

In this study the researcher, in collaboration with the university's Director of University Planning, undertook a post-occupancy evaluation (POE) survey of faculty and students using the teaching facility. The purpose was to examine the strengths and weaknesses of each classroom in relation to faculty and student satisfaction with the space as a place to teach and to learn. The goals were to: (1) identify possible design problems in the classrooms and determine if they could be corrected; and (2) identify design strengths for possible adoption in the design of new or remodeled classrooms on campus.
Two separate questionnaires were developed with input and pilot testing by faculty and students from the institution’s College of Education and Human Development. The first questionnaire was developed for faculty and contained nine questions which focused on satisfaction with the technology provided for the delivery of lectures, ease of hearing student questions, temperature comfort, and overall satisfaction with the classroom space. The second questionnaire was developed for students and contained 11 questions which focused on ease of seeing materials presented in the classroom, seating comfort, and overall satisfaction with the classroom space. The respondents were either asked to write a brief answer, or rank their level of satisfaction on a scale of one to five, with one being the most satisfactory (very good) and five being the least satisfactory (very bad).

From records provided by the university’s Office of Registration and Records, 297 professors teaching in the classrooms evaluated 24 classrooms (classrooms 105, 107, 113 [teleconferencing rooms], 114, 204, and 207 [computer lab] were not evaluated by faculty). Table 1 shows faculty responses to the first five questions. Temperature comfort in the classroom received the only significant “very bad” rating with 22% of faculty responses. To the second part of question two, “Please explain if some technical item is not performing to your satisfaction,” the following concerns were listed: “need instruction and training to use the equipment” (12 faculty); “presenter does not work well, it is not as clear as a traditional overhead” (11 faculty); “replenish markers more often” (7 faculty); “equipment locked and not accessible—faculty need their own key so they do not have to order in advance” (6 faculty); “not a good overhead projector, and can not reach the screen for the overhead” (5 faculty); “request for a media person particularly to help with computer link-ups” (5 faculty); “need audio equipment, particularly for language courses” (2 faculty); “control panel needs to be easier to use, easier to see” (2 faculty); “need more incremental control for lighting” (2 faculty). The following comments were from individual faculty: “television’s placed too high, awkward to look at”; “the big screen is quite useful but complicated to open and start up, especially if it has been used.

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<th>Question</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Very Good</th>
<th>Good</th>
<th>O.K.</th>
<th>Bad</th>
<th>Very Bad</th>
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<td>Q1. Overall satisfaction with classroom space.</td>
<td>2.20</td>
<td>1.06</td>
<td>20.8</td>
<td>35.5</td>
<td>21.5</td>
<td>10.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Q2. Satisfaction with technology provided for lecture delivery.</td>
<td>1.90</td>
<td>0.93</td>
<td>39.7</td>
<td>37.9</td>
<td>15.5</td>
<td>8.0</td>
<td>0.9</td>
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<tr>
<td>Q3. Ease of hearing student questions.</td>
<td>1.90</td>
<td>1.00</td>
<td>43.8</td>
<td>32.2</td>
<td>14.0</td>
<td>9.1</td>
<td>0.8</td>
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<tr>
<td>Q4. Quality of lighting provided for lectures.</td>
<td>1.66</td>
<td>0.95</td>
<td>58.2</td>
<td>25.4</td>
<td>9.8</td>
<td>4.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Q5. Temperature comfort in classroom.</td>
<td>3.06</td>
<td>1.49</td>
<td>23.6</td>
<td>14.6</td>
<td>15.4</td>
<td>24.4</td>
<td>22.0</td>
</tr>
</tbody>
</table>

Table 1. Frequency of faculty responses to categories in questions 1-5 (given in percentages). Also faculty mean and standard deviation scores to questions 1-5 (Scale 1-5: 1 = very good, 5 = very bad)
by a preceding class that has adjusted it differently; “whenever the room next to me is running some-thing on audio, the sound blasts through the wall and drowns me out”; “using the pull-down screen is difficult due to the chairs being so close to the front of the room.”

In response to the question, “Do you like the color of the classroom walls?” 77.6% of the faculty stated yes, and 22.4% stated no. The following statements were given by faculty who replied no: “cold, institutional, and sterile” (16 faculty); “not an issue” (4 faculty); “what color?” (4 faculty); “absence of windows makes the walls inelegant, oppressive” (2 faculty); “prefer bright primary colors, looks like a hospital” (2 faculty); “bizarre and ugly” (1 faculty).

To the question, “Have you had any difficulty with the technology provided to help you deliver your lectures?” 47% stated yes, and 53% stated no. If the reply was yes, the faculty member was asked to describe the difficulty and give a possible solution to the problem. These were their responses: “need training and practice” (11 faculty); “need to be issued a key when the cabinets are locked” (5 faculty); “presenter does not work” (4 faculty); “need to return all systems to normal operating procedure after usage” (3 faculty); “computer smart pad does not work” (3 faculty); “markers run out” (2 faculty); “dislike marker board” (2 faculty); “manuals do not cover all questions on using equipment” (2 faculty); “need DVD and VCR remote for tracking” (2 faculty); “desk is too low, need a lectern” (2 faculty); “DVD and VCR do not operate correctly” (2 faculty). The following comments are from individual faculty: “microphone does not work”; “Macintosh computer hookup does not work”; “need access to make changes during class”; “need a compact disc player”; “problems with the control panel”; “television was out of focus and the sound from another presentation bled through it”; “problems with using the closed circuit television”; “difficulties with coordinating audio and visual presentations”; “VCR and television monitor are not always available”; “dry erase boards are not always practical”; “control panel requires a high chair. Some days the chair is gone and an ordinary chair supplants it”; and, “need more instructions on how to use the equipment; I think with practice things should go more smoothly.” It would be helpful if there was a button that could be pushed to alert the staff of the problem.

To the question, “Based on the quality of the classroom space, would you welcome teaching another class in this room?” 80.3% of the faculty stated yes, and 19.7% stated no. The following comments were made by the faculty who stated no: “classroom too cold to learn and teach in” (11 faculty); “would prefer some windows” (7 faculty); “acoustics are bad, walls need to be made sound-proof” (5 faculty); “markers and board are bad” (4 faculty); “sterile” (4 faculty); “students are cramped, there is not enough space between individual seats” (4 faculty); “limited for moving and grouping of students - not flexible” (2); “the building is not aesthetically pleasing, not inviting” (2 faculty); “need pencil sharpeners” (2 faculty); “the classroom seems like a prison cell” (2 faculty). The following comments were made by individual faculty: “the teaching station limits my movements, I wish it were easier to operate”; “it is as inviting as a dentist's office”; “I would like some posters on the walls”; “maintenance staff is deficient”; “only those near the desk can see me”; “I do not need the fancy equipment, an overhead projector and a podium are sufficient”; “I would rather teach in a warm building with normal lighting and blackboard”; “classroom too long and narrow - feel separated from students”; “space in general is too small”; “need a place to store coats and books”; “need more campus telephones”; “the ‘fortress’ [console] wall needs to be removed so more direct interaction with students can take place. It is hard to get students (25-30) into a circle for discussion.

To the last question, “Please use the back of this sheet to add any other comments about the classroom space,” 52 faculty members responded. Many of the comments were the same as the ones already presented but the following offer new insights: “For overhead use, an electrical outlet on the front of the podium would be convenient”; “These classrooms were obviously not designed by teachers. The idea that a professor would stand off in the corner of the room, as far from the students as possible, and conduct lectures is just silly”; “Why can’t we have podiums so that we don’t have to carry our notes around the room?” “All things considered, these rooms are a big disappointment, and until the heating and cooling problems are corrected, I will avoid teaching in them; overall, my sense of the building is that it was designed for technology, not the people who use it”; “I’ve heard that the lecture halls and computer rooms are better designed, but the classrooms (I have a class in 209) are less than would be expected for $13.5 million; the front of room access for physically challenged students is a problem; please simplify and color code the control panel at the lectern”; “Need a wire-
In response to the question, “Do you feel ‘cramped’ or too close to the person seated at your side?” 31.1% of students stated yes, and 68.9% stated no. To the question, “Is the classroom temperature: 1) too hot; 2) too cold; 3) comfortable,” 6.5% stated too hot, 56.4% stated too cold, and 37.2% stated comfortable.

To the question, “Do you like the color of the classroom walls?” 81.6% stated yes and 18.4% stated no. The following are some of the comments made by the students who replied no: “The classroom walls are too plain, boring, cold, and blah.” “The room color is ugly and you feel you are in prison.” “The depressing, sterile walls remind me of a hospital.” “The glare from the walls bothers me.” “The classroom is too impersonal—add some color and warmth.”

In response to the question, “Based on the quality of the classroom space, would you welcome taking another class in this room?” 84.6% of students stated yes and 15.4% stated no. The following are some of the comments made by the students who stated no: “The seating is uncomfortable and the rows are too long.” “The space is cramped with too many seats in the classroom.” “The room is uncomfortable, cold, and needs windows.” “There are too many gadgets.”

To the last question, “Please use the back of this sheet to add any other comments about the classroom space,” most of the comments already given were restated. Classroom acoustics were criticized (sound from adjoining classrooms), also, lack of space, uncomfortable seating, the cold room temperatures, lack of coat storage, dry markers hard to read on white board, no pencil sharpeners, and teachers’ inability to use equipment. The students receiving language or music instruction

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Very Bad</th>
<th>Bad</th>
<th>Good</th>
<th>D.K.</th>
<th>Very Good</th>
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</thead>
<tbody>
<tr>
<td>Q1. Overall satisfaction with classroom space</td>
<td>2.03</td>
<td>0.86</td>
<td>33.0</td>
<td>18.9</td>
<td>5.2</td>
<td>1.9</td>
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<td>Q2. Seat comfort</td>
<td>2.88</td>
<td>1.06</td>
<td>12.2</td>
<td>33.5</td>
<td>14.2</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>Q3. Ease of seeing materials presented in class</td>
<td>1.56</td>
<td>0.88</td>
<td>37.9</td>
<td>38.1</td>
<td>16.0</td>
<td>5.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Q4. Ease of hearing presentations, whether lecture or video presentations</td>
<td>1.77</td>
<td>0.69</td>
<td>40.2</td>
<td>39.2</td>
<td>10.5</td>
<td>3.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Q5. Quality of light for lectures and note taking</td>
<td>1.72</td>
<td>0.92</td>
<td>50.4</td>
<td>34.5</td>
<td>5.7</td>
<td>3.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Q6. Temperature comfort in classroom</td>
<td>3.30</td>
<td>1.35</td>
<td>11.2</td>
<td>20.1</td>
<td>22.0</td>
<td>19.0</td>
<td>27.1</td>
</tr>
</tbody>
</table>

Table 2. Frequency of student responses to categories in questions 1-6 (given in percentages). Also student mean and standard deviation scores to questions 1-6 (Scale 1-5: 1 = very good, 5 = very bad)

Part 2: Students
Five thousand and forty-eight students taking classes in the facility evaluated 26 classrooms (Classrooms 114, 204, 105, and 107 [teleconferencing rooms] were not evaluated by students). Table 2 shows student responses to the first six questions. Temperature comfort in the classroom received a significant “very bad” rating with 27.1% of student responses. Seating comfort was also identified as a problem for 20.4% of the students (see Table 2).
Joy Potthoff seemed the most satisfied with the classrooms. The quality and easily accessible audio equipment in the classroom made their learning experience enjoyable. Table 3 matrix shows student mean scores for overall satisfaction for each of the 26 classrooms. The lower the mean score, the more satisfactory the room.

Finally, chi-square analysis showed that there were no significant differences found between faculty and students for overall satisfaction with the classrooms ($p = 0.092$). For ease of hearing presentations and questions, the faculty were less satisfied than the students ($p = 0.011$). There were no significant differences between faculty and students in rating the quality of light ($p = 0.199$), however, faculty were significantly more satisfied than the students with temperature comfort ($p = 0.000$).

**DISCUSSION**

The findings showed that the majority of faculty and students were satisfied with the classrooms (overall satisfaction: faculty, 65.3%; students, 73.0%). Six
classrooms (111, 115, 117, 207, 219, and 223) received the best student ratings (mean score 2.00 or under, see Table 3). All but room 207 (computer lab) are large lecture classrooms and have the following interior finishes, furniture, and equipment in common: All six rooms are carpeted. All the floors, except in room 207, are tiered (stepped) and have floor-attached tables and seating. All six classrooms have ceiling-mounted projection monitors and three of the rooms (111, 115, and 117) have a separate projection room at the back of the classroom. Five rooms have rectangular free-standing consoles, room 207 has a peninsula shaped console. Classroom rating was not done for the faculty as the number of responses was too low (125).

However, the author would like to address two problems with the large lecture halls that became evident when she recorded the furniture and finishes in each classroom. Any equipment needed in the large lecture halls has to be carried (usually by two people) down the steps to the front of the classroom. Also, students in wheelchairs are required to sit at the back of the lecture hall as they cannot access the space at the front of the classroom unless they are carried down the steps or enter from outside of the building through exit doors (first floor only).

The faculty gave the classrooms very good and good evaluations for use of technology, ease of hearing student questions (although less satisfied than the students), and lighting quality. The students gave the classrooms very good and good evaluations for ease of seeing materials presented in class, hearing lectures, and lighting quality. For both faculty and students the classrooms were rated poorly for temperature comfort (too cold, students less satisfied than the faculty), and the students also gave seating comfort a poor rating.

CONCLUSION

Faculty and student written comments seem to highlight the fact that faculty and student input was not solicited by the project designers. The author strongly recommends that for future building projects, administrators make sure the planners actively interact with a representative group of the building’s future users. At best, establish a test or prototype classroom similar to the ones developed by Steelcase (Learn Lab) and the College of Education at Brigham Young University. This allows faculty and students to interact with the new technologies and discover what is beneficial to teaching and learning. For example, some of the faculty reported that the video presenters, which allow faculty to show materials (photographs, actual objects) on a large screen with the aid of a video camera, did not give a clear image. According to Fawson and VanUitert (Fawson, C. & VanUitert D., 1990: 3), the developers of the prototype classroom at Brigham Young University, “The initial programming provided for preset levels of the incandescent and fluorescent lighting for a number of different classroom activities. Even partial fluorescent lighting could dramatically reduce the effectiveness of images projected through the video projector; therefore, they are not used in connection with media presentations.” In the facility, only rooms 111, 115 and 117 have a mix of florescent and incandescent lighting. All the other classrooms are illuminated solely by fluorescent lights.

The development of a prototype classroom would also help to resolve some of the problems associated with the console design and location, and with classroom crowding and seating comfort. According to Blackett and Stanfield, wider and shorter spaces provide for more student/teacher interaction (Blackett, A. & Stanfield, B., 1994:26). Unfortunately, many of the classrooms in the building are narrow and long and put more space between student and teacher. Also, there is the potential for less interaction because of the intervening “wall” of the console which is permanently fixed in the front corner of the classroom. Blackett and Stanfield stated that there is still a need for smaller, flexible design classrooms as the lecture/discussion form of teaching (30 students or less) is not going to disappear (Blackett, A. & Stanfield, B., 1994:29). The needs of this teaching form need to be carefully examined so the advantages of using technology can be successfully used. The Steelcase LearnLab prototype meets this challenge as the classroom spaces was designed so that the instructor and students can easily reconfigure the Learn Lab’s mobile tables and chairs and other equipment including a mobile lectern made possible by a wired floor that permits the instructor and students to move about the space for different activities (e.g., huddle groups) and incorporates multiple projectors for large scale displays (Steelcase, 2006-b:6). The author believes that this problem needs to be addressed in the teaching facility under assessment.

The large lecture classrooms are successful
(apart from difficulties with equipment delivery and accessibility for students in wheelchairs) and the classrooms where the professor uses technical equipment for most of the class period (languages, music) are also successful. Where the classroom space seems to be less successful is when the technology is used only occasionally. Crowded, windowless, impersonal rooms with uncomfortable seating and seating arrangements that are awkward to change do not promote feelings of comfort conducive to good teaching and learning experiences. The author recommends that, with faculty and student input, designate certain classrooms as effective learning retreats (class size of 30 and under). Remove the present chairs with attached tablets. Replace these chairs with upholstered seating with tablets that can be used for writing or moved down in a vertical position to the side of the chair. Carpet the floors and install incandescent lighting on a dimmer switch to reduce room glare. Finally, change the wall finishes so they seem less institutional (prison, hospital) in character. Add texture, either with paint, wallpaper, or fabric, and personalize the walls with information boards, posters, and art work, creating a friendly, comfortable space in which to teach, communicate and learn.

REFERENCES


THE USERS IN MIND: Utilizing Henry Sanoff’s Methods in Investigating the Learning Environment

Ashraf M. Salama

Abstract
The educational process in schools involves many activities that ultimately aim at testing students’ motivation, knowledge assimilation, academic performance, and teachers’ productivity. How these activities are accommodated in a responsive environment is a critical issue that deserves special attention especially from users’ perspective. This paper analyzes emerging understandings of learning environments. Reactions of teachers and students to classroom and cluster prototypes, among other aspects, against a number of spatial requirements and educational objectives are analyzed and discussed based on two mechanisms. The first is a comparative analysis of reactions of teachers from three elementary schools within Charlotte-Mecklenburg School District. The second part is a case study of a pre-design phase undertaken for redesigning some buildings of North Carolina School of the Arts. The results of this investigation support the assumption on how the school environment has a direct impact on the way in which teaching and learning takes place. A conclusion envisioning the need for going beyond adopting prescriptive measures to address the quality of the learning environment is conceived by highlighting the need to utilize knowledge generated from research findings into school design process, to pursue active roles in sensitizing users about the value of the school environment in reaching the desired academic performance while increasing teachers’ productivity.

Keywords: Learning Environments, Users’ Perspective, Classroom Prototypes, Creativity, Responsive Environments.

INTRODUCTION
In recent years, education theorists voiced the opinion that all education reforms are worthless if children—our future generations—have to come to school in buildings that destroy their spirits, inhibit their creativity, or hinder their academic achievement (Duke, 2002 & 2004; Tanner & Lackney, 2006). The way in which we approach the planning, design, and ultimately our overall perception of learning environments makes powerful statements about how we view education. How school buildings are designed tells us much about how teaching and learning occur. Studies on classroom effectiveness indicate that there are significant differences in the amount of learning taking place in different classrooms within one school or in different schools. The educational process in schools involves a number of activities that supremely test students’ motivation, academic performance, and teachers’ productivity. How these activities are accommodated in a responsive environment is a critical issue that deserves special attention. While it has been said in the past that a good teacher can teach anywhere, a growing body of knowledge suggests a direct correlation between the physical aspects of the learning environment, teaching processes, and learning outcomes (Bosch, 2002; Lackney, 1999).

The literature developed over the past decade corroborates that school environments in different parts of the world are incapable of providing students and teachers with feelings of hospitality, welcoming, and safety (Bosch, 2002; Bosch & Pearce, 2003; Lackney 1994; Meek 1995; Sanoff, 2001-a; Knapp et al., 2007). They operate in environments that inhibit the educational process. Current views on planning and designing learning environments place emphasis on the development of standards and specifications that address what needs to be considered in a school building, but rarely address why and how! In essence, they address the final product—the learning environment itself—without giving enough attention to the process that leads to a good product. Design practices on the other hand do not address pedagogical objectives, teaching methods, or the needs of learners in a clear manner. Behavioral issues such as privacy, personal space, small group behavior, crowding and density are typically oversimplified. Therefore, it is paramount to examine a number of critical issues in school planning and design that foster the creation of learning environments conducive to learning. Duke’s statement—a prominent...
contemporary educator—corresponds with this argument. He states and rightly so “to build or rebuild our schools without thinking the experiences that take place in them seems unwise. These experiences create opportunities to re-design both schools and schooling” (Duke, 2004:11).

Framing up emerging understandings of learning environments, this paper critically analyzes current understandings of learning environments, while emphasizing that the physical environment of an educational building may enhance or hinder essential teaching and learning activities. Based on this analysis the paper calls for a fresh look at the learning environment from the users’ perspective and the need for understanding the culture of the learning environment. It presents the results of investigating different aspects of learning environments by measuring reactions of teachers and students to classroom prototypes and cluster typologies, among other aspects, against a number of spatial requirements and educational and behavioral objectives. Such an investigation is carried out in two parts: The first is a preliminary comparative analysis of responses of teachers from three elementary schools within Charlotte-Mecklenburg School District. The second part is a case study of a pre-design phase undertaken for designing and remodeling the buildings of North Carolina School of the Arts. The results of this investigation support the assumption on how the school environment has a direct impact on the way in which teaching and learning takes place. A conclusion envisioning the need for going beyond adopting prescriptive measures to address the quality of the learning environment is conceived by highlighting the need to utilize knowledge generated from research findings into school design process, to pursue active roles in sensitizing users about the value of the school environment in reaching the desired academic performance while increasing teachers’ productivity.

EMERGING UNDERSTANDINGS OF LEARNING ENVIRONMENTS

Over the past fifteen years there has been a worldwide surge in the design and construction of learning environments. This was coupled with a growing body of knowledge on how the physical environment may support teaching and learning processes. A number of new concepts were generated to respond to the changing needs of teachers and learners thereby establishing new understandings of the physical as well as the social aspects of the learning environment (Salama, 2004). Such understandings can be categorized under several headings that articulate how schools and schooling are viewed today.

Schools within a School and the Emergence of the Academic House Concept

The notion that increasing the size of schools was an important reform idea is fundamentally flawed. It has led to the emergence of mega schools throughout the world. Although it is believed that they are cost effective findings of recent research reveal that such environments discourage a sense of responsibility and meaningful engagement while students’ misconduct appear to be highly visible. Recent knowledge on the other hand suggests that smaller schools offer students greater opportunities to participate in extracurricular activities and to exercise leadership roles (Lackney, 1994; Sanoff, 2002).

Paradigm shifts in thinking about school size can be seen in the academic house concept where the school community is divided into smaller academic houses or units acting as clusters and composed of a number of learning centers. The grouping of students and teachers into small interdisciplinary teams allows a sense of closeness to develop between them and enhances intellectual growth and academic performance while fostering emotional and social maturity and designing for mixed age groups (Bingler, 1995).

The School as a Community Hub

One of the vital directions for education in the 21st century is to design the school as a community hub (Fiske, 1991; Moore and Lackney, 1995; Nair, 2003). New schools are currently planned to reflect this concept (Sanoff, 2002). Recreational centers and community libraries are functions that help achieve the integration of the school into community activities. Architecturally, the school may wrap the community functions. Schedules are developed so that everyone in the community can use the school building. To encourage the use of the school year round, save resources and create a heart for the community, proposed programs may include adult education classes, job training centers, social services, community clinics, and general facilities for the community. However, it mandates the rethinking of the school function and the school architectural program to accommodate this vision.
Emerging Classroom Typologies
The classroom is the setting in which education takes place. Traditionally, a standardized classroom plan was designed to maintain order and control a student behavior. Silence was encouraged in order to keep students more focused. At the beginning of the 20th century the bleacher-style seating and sloped floors was envisioned to aid the teacher’s supervision of the classroom. By the mid twenties rectangular classrooms had become universal. Studies on classroom effectiveness indicate that there are significant differences in the amount of learning taking place in different classrooms within a school and in different schools (Butin, 2000; Sanoff, 2001-b.).

It is critical for architects to recognize that not all children learn the same. With some children visual learning, such as printing or instructional films, has the greatest impact others learn better through verbal and spoken words such as story telling. Classrooms need to be designed to reflect a particular form of teaching behavior and to represent a teaching/learning process that achieves specific pedagogical objectives. Responsive architects and educators started to reconfigure classrooms into different typologies that invigorate educational and behavioral goals (Salama and Adams, 2003-a & b). These include achieving a sense of identity and belonging, facilitating team teaching, working on small groups, and accommodating a spectrum of learning opportunities (Sanoff, 2001-b.). In this respect, one should assert that architects need to develop comprehensive understanding of the wide range of prototypes and what impact they have on achieving desired educational outcomes.

Community Involvement: A User Centered Process
Addressing the needs and behaviors of those who occupy the learning environment in a school planning process requires that those who actually dwell in the space be part of the process. Many architects and scholars adopt this view. Decisions about learning environments are still made by a few that affect many. Henry Sanoff, Distinguished Emeritus Professor of Architecture at North Carolina State University argues that “not involving everyone can cripple the outcome for years to come” (Sanoff, 2001-a). Involving the school community requires intensive and collaborative process. Such a process needs to be flexible to meet the requirements of different design situations. It often begins with interviews and walkthrough evaluation of the existing facility, establishing the stage for an initial workshop. (Sanoff, 1994)

Participants working in small groups write wish poems of their needs and desires. Special workshops are conducted with children or students based on the school type; these allow them to voice their opinion about their new school. Next, teachers and administrators develop a dialogue that is facilitated by the design team and that involves a discussion of the educational objectives and the spaces required for accommodating teaching and learning activities. A follow up design workshop and a site walkthrough are conducted to explore options and design concepts while discovering the site constraints and realities. In these workshops, the basic organization of the site and the school building are explored and discussed with consensus arrived at about the future direction to be pursued.

THE NEED FOR RE-CONCEIVING THE CULTURE OF THE LEARNING ENVIRONMENT

The emerging understandings of learning environments represent many of the dynamics of how teaching/learning occurs. They manifest a cultural shift in terms of the way in which the learning environment is now comprehended by both architects and education theorists. Successful designing of learning environments can be achieved when designers recognize the nature of a school culture and its dynamics. In this respect, one can argue that culture is maintained in schools through a process by which formal and informal learning is integrated where socialization and interaction between teachers and students occur.

Oversimplifying the importance of a school culture is usually associated with a lack of understanding of the dynamics that characterize the learning environment, and an assumption that culture is unimportant (Sanoff, 2001-b; Trimble, 1996). The question that can be raised at this point is what constitutes the culture of the learning environment? And how such a culture can be addressed?

There are many factors that contribute to how the culture of the learning environment is shaped. They include the physical and social context in which it operates, its history, and the way in which it is managed and supported. However, based on the preceding outline of emerging understandings of learning environments, one can assert that the most important factors would relate to users
The Users in Mind: Utilizing Henry Sanoff’s methods... expectations of what should or should not happen, how they comprehend their environment, adapt to it, react to it, how they sustain their educational beliefs and standards, and how they conceive the role their physical environment may play to support required teaching and learning activities. In essence, this suggests that there is a need to continuously get feedback on how these environments work, especially from the users’ perspective, by exploratory investigation and collaborative processes.

TEACHERS’ REACTIONS TO CLASSROOM PROTOTYPES

Based on the classroom arrangement rating scale that was developed by Henry Sanoff in 1995 and 2002 and was implemented by the Adams Group Architects in several collaborative design processes (Salama & Adams, 2003-b), an exploratory investigation process was devised to get reactions from teachers of three elementary schools in Charlotte Mecklenburg School District, North Carolina. Six classroom prototypes and five classroom cluster arrangements were examined and analytically compared against a number of spatial requirements and educational objectives (Figure 1-a & b). Such requirements and objectives reflect the emerging understandings of learning environments and the need for understanding a school culture. The three schools selected to conduct this investigation were Old Providence, Myers Park, and Carmel Christian elementary schools. They were selected to represent different contexts where Old Providence is a newly designed and built school in southern Charlotte, Myers Park is housed in a historical building in a historic neighborhood that was undergoing intensive renovation and expansion, and Carmel Christian is a new private school of a Church organization in the suburbs of Charlotte.

STUDENTS’ REACTIONS TO THEIR FUTURE ENVIRONMENT

In a collaborative pre-design process undertaken by the author among other team members at the Adams Group Architects that was developed in 2003 and 2004 as part of renovating, remodeling, and designing new buildings at North Carolina School of the Arts two major sessions were conducted. The overall purpose of these sessions was to develop an understanding of how students conceive the future of their school and to examine a number of aspects included in the scope of work (Figure 2-a & b). The first session involved investigating students' reactions to classroom and cluster prototypes to be utilized in the remodeling of class-
The second session involved a structured discussion on their preferences of the image of a dance studio that was conceived as a new building to be introduced in the project site. It also encompassed comprehending their preferences of the future yard/breezeway located between the new and existing buildings (Figure 3).
While teachers’ reactions to classroom arrangement rating scale vary dramatically, it appears that there were certain preferences of some classroom arrangement types over others. Teachers reacted to prototypes 2 and 3 as having the most positive features that pertain to meeting spatial requirements while invigorating the achievement of educational objectives (Figure 4). Notably, classroom prototype 2 received 11, 26, and 13 positive reactions from Old Providence, Myers Park, and Carmel Christian respectively. The second highest number of positive reactions from teachers was given to prototype 3 by the teachers in this sequence Old Providence (34), Myers Park (9), and Carmel Christian (9).

Evidently, prototype 2 was most preferred by Myers Park teachers as it offers a resource and teacher work area in the middle of a cluster of four classrooms. The idea that classrooms are accessed only from the work area seems to be favored by the teachers as it allows for easy control over children movement and easy supervision. On the other hand, prototype 3 was most preferred by Old Providence school teachers as it offers an L-shaped spatial organization that facilitates the presence of several learning activities at the same time. However, some teachers noted that prototype 3 was misleading because it appeared larger in area than all other prototypes. As well, few teachers noted that the way in which it is organized requires the presence of the teacher’s assistant all the time in class. While there are some similarities between prototypes 3 and 4, only 4 positive reactions were given to prototype 4 as it appeared smaller significantly. Strikingly, prototypes 1 and 6 were given few positive responses only by Carmel School teachers.

Examining classroom cluster typology reveals that the staggered-single loaded type was the most preferred by Old Providence school teachers as it offers an L-shaped spatial organization that facilitates the presence of several learning activities at the same time. However, some teachers noted that prototype 3 was misleading because it appeared larger in area than all other prototypes. As well, few teachers noted that the way in which it is organized requires the presence of the teacher’s assistant all the time in class. While there are some similarities between prototypes 3 and 4, only 4 positive reactions were given to prototype 4 as it appeared smaller significantly. Strikingly, prototypes 1 and 6 were given few positive responses only by Carmel School teachers.

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ond preference where 25 teachers associated such a type with the best arrangement that allows for indoor-outdoor integration while achieving the most welcoming entrance. The linear-double loaded type was not associated with any positive aspect stated in the classroom typology sheet (Figure 1-b).

Discussions with NCSA students in the first session reveals responses to classroom arrangement rating scale different from that from that of teachers of the three elementary schools. Prototype 3, the L-shaped arrangement was the most preferred by the students where 29 out of 35 associated it with aspects that pertain to having sufficient opportunities to move around, variety of seating arrangements, and students and teachers can make quick transition from one activity to another. Unlike teachers, students have not commented on the issue of the relative classroom size and thus prototype 4 was the second preferred arrangement favored where 28 students associated it with aspects related to small groups working independently on different activities or projects while having a sense of identity and belonging. Prototypes 1 and 6 were not associated with any positive aspect stated in classroom arrangement rating scale (Figure 1-a).

The exploration of a best fit image of a dance studio reveals that images B and F (Figure 2-a) are seen as equal by the majority of students and are regarded as the best images that reflect a unique identity for a dance studio at NCSA. Students commented that both images introduce "something new" in a traditional campus image while at the same time are not in conflict with the existing buildings. Image C appears to be the most disliked by the students as 30 out of 35 students commented that the building may look pleasing on its own, but it looks odd in terms of colors and textures when compared with the surrounding buildings. While image A relates to the context almost all students did not like it as they felt it does not express a dance studio and looks like a typical traditional classroom building.

In discussing the breezeway or the pedestrian street between buildings all students agreed that colors, natural plants, sculpture and art works are critical aspects needed when re-designing any outdoor space on campus. The majority of students could not understand the meaning of flexibility. However, when the term was explained to them in physical terms the majority felt the value of having variety of arrangements that are adjustable and adaptable to changing outdoor learning and recreational activities.

The preceding analysis suggests that the learning environment is viewed differently by different users groups and within one group based on their past experiences, backgrounds, needs, and roles they play within the environment. For teachers, their reactions are based on how they view education and the physical environment in which they believe they can be more productive. Moreover, they have reacted differently based on their understanding of how a classroom arrangement or a cluster prototype may foster the achievement of the educational program adopted within the school. On the other hand, the consensus witnessed among the students in viewing how their future environment may be shaped reflects some form of dissatisfaction with their existing environment. It also highlights collective aspirations on how the reshaping of the existing environment and the introduction of new buildings may take place.

CONCLUSION: PROLOGUE FOR THE FUTURE OF LEARNING ENVIRONMENTS

The objective of this paper is to suggest mechanisms by which architects can develop a comprehensive understanding of learning environments from users' perspective. Based on a critical analysis of recent conceptions and emerging understandings of learning environments an investigation of users' reactions to a number of aspects was undertaken. It included an examination of classroom prototypes, cluster typologies, image making and outdoor environment. The results reveal that the learning environment is viewed differently by different users groups and within one group based on their past experiences, backgrounds, needs, and roles they play within the environment. Whether teachers or students, reactions reflect the dynamics of the learning environment and how it needs to be viewed from the perspective of those who actually use it. Their insight is believed to be indispensable toward a deeper insight into how the environment can support learning and can invigorate the achievement of desired educational objectives. While such results are qualitative in nature, they provide a base for important future considerations when investigating, introducing change in existing environments, or designing new environments. Such a base can be articulated in two different but
related issues which are outlined hereunder.

From guidance documents to users awareness and feedback

Current practices for creating learning environments involve two major approaches: top-down and bottom-up. The top-down approach refers to initiatives led by the authorities or decision makers. It aims at developing policies, strategies, and standards. However, this approach was heavily accused of being more evaluative than informative, and that it relies on forcing the professional community to be aware of an issue then responding to it. The bottom-up approach refers to initiatives led by the community and facilitated by professionals. It aims at building public and professional awareness, while providing feedback mechanisms. It is more informative than evaluative and relies heavily on developing a common understanding, a common language, and develops a sense of responsibility toward the environment (Salama, 2002 & 2003). The top-down approach is generally adopted and emphasized in the form of guidance documents while the bottom-up approach is over simplified. Two questions can be raised here: “Have the guidelines been transformed into real practices?” And, “why do we not find as many examples of responsive learning environments as we find this accumulation of knowledge developed in the last few years?”

Typically, guidelines introduce technical measures and recommendations. They encapsulate the best building practices that address the professional community. However, they are always rough, mainly addressing quantitative aspects. Guidelines are always generic and do not address a specific context or specific user group. Some scholars believe that by developing guidelines socially and environmentally responsive learning environments can be realized. In this respect, one can assert that no guidelines are ever final; they evolve over time according to the changing circumstances. Therefore, they have to be strategically developed to respond to emerging needs and to the nature of the users. In fact, they do not provide blue prints on how responsive environments can be developed, only an expectation about the good pretty picture of what the future might be. The bottom-up approach that emphasizes users’ awareness and involvement was also criticized in terms of time consumption. Some argue that time invested in training programs and awareness campaigns is excessive. Although recent literature corroborates that the results are far reaching, some scholars argue the process consumes considerable time while developing positive attitudes toward the environment and reconfiguring the culture of sustainable building management and operation.

The preceding understanding suggests that while emphasis has been placed on the top-down approach to design learning environments, the bottom-up approach has been oversimplified or ignored. In this regard, it is believed that both approaches are needed and none of them can replace the other. Mechanisms such as those presented in this paper may support effective bottom-up strategies for creating learning environment.

From intuition and intrinsic feelings to evidence based design

The architecture of learning environments in many cases makes little reference to anything but the creative impulses of the architect who tends to adopt this view: “I am human, I am designing for humans, then why can’t I be the model for what all other human beings need in the built environment?” (Sanoff, 1995). This is completely contrary to the ethical and social responsibility of architecture as a profession. Designers of learning environments do not particularly look forward nor have an interest in seeing the advantage of developing detailed knowledge about users, teachers and students as resources for design except when functional programmatic standards are at the forefront. In typical practices for designing learning environments it is generally accepted that good environments result from inspired thinking and doing where cultural sensitivity, technical skill, and intuitive understanding are creatively interwoven in the architect’s personal synthesis. Typically, users enter such a synthesis in the form of the designer’s own experiences. In this respect, it should be emphasized that creating learning environments resulting from the users experiencing them is crucial. The recognition of how the users of learning environments perceive, comprehend, and animate these environments is what creates responsive buildings amenable to students’ motivation and good academic performance and teachers’ productivity.

Among the challenges facing designers of learning environments is a growing interest in evidence-based design. While the mechanisms adopted in this paper may help satisfy this interest partially, examining the literature cited in this paper and elsewhere reveals that evidence-based design is a “rigorous, hypothesis-testing” approach to
design practice that builds on a literature of user-oriented building evaluation research, namely post occupancy evaluation-POE. Bringing the authority of some form of investigation or scientific method into designing learning environments should be a priority. A designer’s desire to lend the authority of investigating teachers and users needs to the art and pragmatics of educational buildings is now receiving considerable attention. A school district’s desire for greater accountability with less uncertainty needs to be incorporated into collaborative and research processes for understanding users’ needs. Design conventions that evolve through empirical evaluation and reactions of users of learning environments are likely to be better and any approach that welcomes users based research into design practice is promising.

The mechanisms presented in the context of this paper presents a dramatic departure from current practices to placing more emphasis on the value of creating awareness and getting feedback from current and future users of learning environment, while attempting to develop evidence to be utilized. Future architects need to continuously investigate the impact of the environment on learning, to utilize knowledge generated from research findings into school design, to pursue active roles in sensitizing clients and users about the value of the school environment in achieving outstanding academic performance and in increasing teachers’ productivity. They need to be able to involve representatives of the school community in making decisions about the future learning environment. Doing so requires new roles and new skills that go beyond the capacity of traditional architects.

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TOPOGRAPHIES AND SHRINES: Creating Responsive Learning Environments

Iris Aravot

Abstract
With most people living in ‘archipelagoes of peripheries’ in a late capitalist global regime, on an earth struggling with environmental crises, the mission of learning environments is to provide the pod for growth, whether for kindergarten children, teenagers or adults in lifelong learning. The pod is both a protective and an enabling surrounding, and itself a living part of a greater organism. The paper proposes an approach to creation of learning environments through the intertwining of topographies - the owned and continual space of everyday life and dwelling; shrines - the spaces for the new, the exalted, the non habitual; and making by the community - the continual collaboration of the community, teachers and pupils in the design and re-design of the learning environments. All three counterparts are profoundly context related, soundly local and of uttermost significance to identity, belonging and hence wellbeing. The paper unfolds knowledge from diverse sources, ranging from scientific to phenomenological research, from non-conventional community-specific learning environments to historical precedents, and from architectural theory to practical-professional experience of the author. The resulting approach, summarized in a metaphorical nutshell as Topographies and Shrines aims at a pod-environment of learning: responsive, inclusive, and supportive.

Keywords: Learning-Environments, Community, Responsive-Design, Dwelling, Phenomenology.

INTRODUCTION
On an earth struggling with environmental crises, with most people urbanites in a late capitalist global regime, the mission of learning environments is to provide the pod for growth, whether for kindergarten children, teenagers or adults in lifelong learning (Higgins et al., 2005:3). The pod, a vessel containing the seeds of a plant, is both a protective and an enabling surrounding; itself a living part of a greater organism.

While the upper classes will continue to compete in elitist pre-kindergartens, private schools, and Ivy League Universities, for all others, learning environments must be community rooted pods, where anxiety is well contained (Winnicott, 1971) and the natural desire and ability to learn are enabled and nurtured. Winnicott's transitional space, whether physical and/or abstract, is the facilitating environment for learning, with the capacity to hold and detoxify projections of fear, anger and anxiety. It is accomplished by caregiver/s and objective surroundings.

As the teacher is a primary caregiver in the learning process, and the learner - the primary beneficent, learning environment can assist in containment of both teacher and learner.

In this asymmetrical situation, the teacher must lean on the help of the surrounding community to succeed in his/her cardinal task of creating a habitus¹ (Bourdieu & Passeron, 1977), which renders growth through learning possible and makes learning attractive². True, the greatest teachers may have sat under a tree. Nevertheless, the built physical environment has its share in ensuring the persistence of a sustainable education pod and an impact on the overall embracing attitude towards learning, effective teaching and improvement in student achievement.

The proposed approach to shaping the built physical environment of learning is entitled in accord with its essential components: Topography and Shrines.

Topography (Greek: topos - place). - forms a safe basis and platform for diverse uses and interpretations. Topographies are the owned surroundings where learners, teachers and the community imprint their identity and creativity on the learned material as their own. As opposed to that:

Shrines (Latin: scrinium - box) - are places in the learning environment designated to particular themes or singular purposes. In shrines the learners, teachers and community grasp or promote spheres of knowledge and experience
that are not yet the learners’ own. Shrines for one group may be topographies for others.

Both topographies and shrines have material and physical configurations, which structure the relationships of the learning environment, both inwardly and outwardly. They are based on five premises:

- **Firstly:** Learning surroundings must be in line with the pedagogic approach therein practiced (Stevenson, 2007; Higgins, 2005).
- **Secondly:** Learning is situated, i.e. differing from one culture to another and metamorphosing within each of them (McGregor, 2004).
- **Thirdly:** For learning, a plethora of human capacities must be harnessed; all the senses, reason and emotions, imagination and intuition, motivation and memory, creativity and communication (Koestler, 1964; Winnicott, 1971; Gardner, 1983).
- **Fourthly:** Learning is not done by an isolated and detached ego, but swings between reflection and action, since "Learning - whether by a child or by an adult - can be seen as an oscillation between play, practice and exploring" (Hodgkin, 1985:46).
- **Fifthly:** Genuine community involvement in education is essential because "those schools that succeed all have a common thread: community involvement" (Horne, 2004: Stevenson, 2007); and that the principle of Learning Communities (Littleton et al., 2004) is relevant in appropriated terms for all, from kindergarten through adult education.

### SHRINES, THRESHOLDS AND SMOOTH TOPOGRAPHIES

Topographies and Shrines have tectonic implications at local functional and symbolic levels, as well as broader phenomenological aspects. The former provide an important path of resistance to the homogenization of the built environment, whereas the latter refer to tectonics as expressive in its own making and its relationship to earth and sky.

Frampton discusses a tectonic parallel to Topographies and Shrines, (Frampton, 1995), suggesting a basic differentiation between ‘earthwork’ and ‘frame’ or ‘lightwork’. The earthwork is heavy, constructed through the piling of identical units. It marks the site, and its representational function is exposure. In contrast, the frame is lightweight, built of varying elements. It is the realization of form, and its major representational function is enclosure. ‘Earthwork’ and ‘lightwork’ are brought together in the joint that articulates the difference between cultures and building cultures. Tectonics has an ontological dimension: earthwork is the given, lightwork is the becoming; and an anthropological dimension: the embodied vs. the spiritual. Inseparable from earthwork, is the hearth, “that incorporates in a single element the public and spiritual nexus of the built domain” (Frampton, 1995: 381).

It is according to this conjoined duality, that learning surroundings may facilitate growth and change, while also safeguarding a secure foothold in a shared lifeworld. Earthwork forms the continuity with the place of the community, while lightwork provides the space for advancing beyond the habituated.

Therefore, earthwork and the surrounding environment must form a continual, smooth topography. Deleuze and Guattari (1987) characterize movement in ‘smooth space’, both in actual space and in the space of thought, as open-ended, rhizomatic, haptic, intensive, multiply-connected, ‘word of the street’ (Mahoney, 2002). In architectural thought, Lynn (1998) maintains that the ‘smooth mixture’ allows continuous co-existence of different conditions, while maintaining their identity.

Thus, smooth topography is where learners, teachers and community are involved in intertwined making, imprinted by and imprinting a shared lifeworld, evolving over time and allowing local ownership - "a generic space for students to be colonized with teachers, which is decorated by the students to give them ownership, and teachers and students only move when necessary to access specialized space" (Bunting, 2004:11-12).

As opposed to ‘smooth’ space, ‘striated’ space of thought is structured, enclosed, "word of the fort", directed towards one’s point of orientation. (Bunting, 2004:11-12) In this paper’s terminology: in shrines learners confront the new. It is here that mind and body make the greatest effort towards growth and metamorphosis, where the habituated is transcended. However, topographies and shrines are not pure elements. Deleuze and Guattari (Bunting, 2004) also point out that the polarization of ‘smooth space’ and ‘striated space’ is more of a conceptual construct, and in reality they co-exist in various mixtures. Such co-existence necessarily implies joints or edges of profound symbolic and functional importance, to the degree that the edges themselves are elaborated into distinct spaces, with edges of their own.
An example of such an elaborated space is the entrance. A recent report on the future of higher education in the UK (Jisc, 2007) dedicates a distinct chapter to entrances, emphasizing the sense of excitement about learning, welcoming atmosphere, clear orientation, safety and security that must characterize this space. The following quotation is instructive: "when you walk through the door of a place of learning, you should feel proud, uplifted, motivated" (Jisc, 2007). Dimensions, design, materials, technology etc. may vary, but the significance of entrance remains essential.

Similarly, interpretations of 'topography' and 'shrine' also are context dependent. Topographies may refer to all learning spaces that are not allocated for one purpose alone, such as generic classrooms, multi-purpose spaces, yards, gardens and open spaces, etc. and "places of space" that "offer the potential for dreaming, thinking, for sorties into the imagination, for reflecting and simply for being" (Dixon, 2004: 22). Shrines may refer to designated learning spaces, such as science and language laboratories, art studios and music rooms. Both types require extended interpretations to meet particular situations.

**NON-CONVENTIONAL URBAN LEARNING**

Following are two examples from Tel-Aviv, both focusing on non-conventional learning pedagogies in specific urban contexts. "One on One" by Keren Eshed proposes a variety of small 'homes for learn-
ing" for youth in the Hatikva neighborhood. With difficult socio-cultural and economic personal histories, these teenagers tend to malinger and resent any type of schooling.

"One on One" project mapped out the location of craftsmen, artisans and artists in the neighborhood, as potential informal teachers; for example, a cook, a traditional calligraphist and an actor. It proposed adding a small studio to each of the teachers' homes, with spaces for learning and practicing, in a framework resembling traditional apprenticeship and coordinated as open learning. In this project, smooth topographies dominate, shrines are camouflaged as topographies and edges are minimal.

"Street Smarts" by Meirav Konforti and Nancy Sandulovici is a reading of the urban environment itself as a learning topography, wherein shrines are incorporated as infill. Life-long, adult learning, high-school classes and a small academy of arts are accommodated as an additional system within the public realm. They say "in an age of extensive approach to data, we believe that it is in the capacity of the learning system to identify, refer, disclose and reflect flexible learning possibilities for all". Located in the charming yet deteriorating Florentine neighborhood, the project opens up new pathways in urban blocks. These pathways function as inviting entrance, providing a continuum of neighborhood topography. They lead to shrines such as classes, music studios and media workshops.

SENSORY VARIABLES AND WELL-BEING

Topographies and Shrines is a phenomenologically based concept, hence seeking profound intuition of the particular in its uniqueness. Although particularities of place, time, community and pedagogy can never be circumvented or bypassed, there are areas of common agreement from scientific research that form a second layer of our approach. It adds on important categories (though not specific recommendations, which are culturally and geographically dependent) connecting sensory and well-being variables to the shaping of learning environments. Sensory variables relate physical conditions with learning and teaching performance, while well-being variables also result from the socio-cultural aspects of physical conditions.

Sensory variables include light and color, air quality with an emphasis on temperature, humidity
and ventilation, acoustic characteristics, haptic characteristics and indirectly all variables that influence health. Research shows that when these variables, take on extreme values, they render underperformance in both teaching and learning. (For summaries of literature, mostly of behaviorist studies, see V.I.T., 2005). Unfortunately, less research has been conducted on the beneficent influence of sensory variables, the only typical, although highly controversial exception being color.

For example, a school for children with ADHD (Attention Deficit Hyperactivity Disorder) in Copenhagen was designed with very specific shades of blue and peach to enhance concentration and learning abilities. (Topaz, 2003). Interestingly enough, the project architect describes a phenomenological research with strong intersubjective results, undertaken by visitors to the school.

Another much under-researched zone concerns the combined effect of individual variables. Therefore, in this crucial aspect, Topographies and Shrines leans on multi-sensory approaches to archi-

Figure 3. Learning surroundings in Florentine. Studies of building- infill -types.
"Street Smarts" (Konforti and Sandulovici).
Environmental Sustainability

Green architecture forms an integral part of the present approach, with its emphasis on locality, sensory comfort, emphasis of identity, ownership and belonging. Phenomenological approaches to architecture as ecology have also been acknowledged (Seamon, 1994). Precedents, best practices and applied knowledge have already connected green school buildings with advantages, not only for users’ well-being, but for education and pedagogy too, e.g. “High Performance School” and “Learning Garden” (for many examples: NCEF, 2008). Topographies and Shrines emphasizes environmental sustainability, not as a green architectural object but as an ongoing process of mutual adaptation with cultural and natural surroundings. It is not only about design for energy efficiency, water recycling, etc., but also about maintenance, care, leadership and organization; i.e. the actual sort of sustenance and support that the community is willing and able to provide. From this perspective, lower degrees of environmental sustainability in the short run might sometimes be of better consequences in the long run (Chung, 2008).

Re-negotiation of Beauty

A recent, integrative, psychoanalytic model of the sense of beauty indicates that beauty reconciles the polarization of self and world, has an important restorative function for the self, reconciling self-states of fragmentation and depletion, protects against self-crisis and alleviates anxiety and feelings of vulnerability (Hagman, 2002; Aravot, 2008). Thus, beauty is vital for well-being (Cold, 2001). Considering what constitutes the beauty of specific learning surroundings, is an inter-subjective process to be undertaken and nourished by the community. Emphasizing beauty implies emphasizing care, and active caring nurtures owning, belonging and identity.

An interesting example can be found in the Bidwell Training Center in Pittsburg, Pennsylvania. It offers programs for adults of various backgrounds and capabilities, providing career paths in the high-tech, horticulture, culinary and medical fields. Two of its features are of special interest: the very highly aesthetic characteristics of the place, including original valuable art works; and the fact that the cooking students provide excellent meals to the community of learners. This catering to all senses and the care taken in the emphasis of high value aesthetic works, makes the Bidwell Training Center distinct with features that closely resemble a home.

First-rate Communication

The primary mode of communication within learning environments has and always will be “face to face” personal or small group communication. In the present “age of knowledge” however, the very adjustment of learning surroundings to personalized environments (of both teacher and learner) is overtly connected to the high-tech systems in use. Research shows that an integration of ITC - Information Communications Technologies - contributes to both the redesign of learning space and to communication. It impacts educational activities by accessing previously inaccessible resources; facilitating student and staff networking both inwardly and with the wider community. It also contributes to accommodation of learning style, leading intelligence and interest. Some new spatial areas born out of ITC are: technology rich-spaces, learning cafés, learning streets, interactive classrooms, multimedia rooms and teaching clusters (Jisc, 2007, Stevenson, 2007; Peck et al., 2007). Interestingly, it is the most advanced communications technology that opens up opportunities for meaningful breaks from artificial indoor surroundings, through the use of outdoor classes, pocket-gardens, etc.

Well-being, in its multifarious sensory, intellectual, emotional, cultural and social aspects, is connected to three additional concepts of unequivocal implications for design: a. First-rate Communication b. Environmental Sustainability and c. Re-negotiation of Beauty.
LEARNING ENVIRONMENTS, CONTINUAL MAKING AND THE COMMUNITY

Discourse on the future of learning in the 21st century envisions three alternatives: a. "Business as usual" or "more of the same"; b. Cyber schooling - i.e. dissolution of learning environments as institutions and physical surroundings, in favor of learning as personal consumption, and c. Community learning centers. "Add on additional forms of learning for all ages, food at all times and additional community services such as health and sports. Would this then be the glue to hold the community together?" (Bunting, 2004). Topographies and Shrines clearly advocates the latter, including an explicitly affirmative reply: yes, learning environments as the locus of continual community making has the power to hold the community together, assuming that a majority of individual community members choose to actively undertake this project. It is a demanding and continual act of self-empowering; necessitating leadership, organization and fund raising.

Topographies and Shrines as an act of building constitutes part of the community making process, but it alone can never be the initiating step. It has to follow socio-cultural phases, from acknowledging the functional and social centrality of the learning space for the community as a whole, and up to main outlining of pedagogical agendas. The latter are beyond present scope. The following will therefore focus on the introduction of physical counterparts into the process of community making. As a Heideggerian insight (Heidegger, 1977 (c1954)), the function of building is to guard and preserve the essence of dwelling, forever linked with the act of building. Therefore, the way something is built - what (materials), how (technology) who (makers) and where (place) - becomes part of its essence. In the same vein, the phases that initiate a Topographies and Shrines building project are: a. Imagining the Project Experience, b. Imagining the Project in its Place, and c. Confirming the Preliminary Image in the Context of and by the Community. After these phases, the three-dimensional design is ready to take off, with various mechanisms of community participation (Sanoff, 2000; NCEF, 2008).

Imagining the Project Experience

Architectural projects commonly start with a brief - a reductionist and usually quantitative interpretation of the built spaces projected into the future. Instead, we start with unfolding the preferred experiences of the future surroundings. Students, teachers and the wider community participate at their own pace through their preferred modes of expression. These include: talks, written texts, visual and other creative expressions of the imagined experiences themselves, metaphors, analogies, precedents, etc., Following are some examples from an educational project, a kindergarten to high school in the village of Maale-Zvia, Israel, where the author is presently involved as architect.

Figure 4 presents teachers’ discussion. This particular group was very conscious of its own experience as related to an older, existing school, and to pedagogical aims. They undertook phenomenological research, concluding with concepts such as “heart of the community”, “smooth spaces of classrooms” and “environments as textbooks”, as...
well as with specifications of shapes, forms and materials to characterize topographies and particular shrines. For example: porous covering of floors and walls, indoor inclusion of plants and water.

Figure 5 presents pupils imagining and imaging their Future School. This event was led by one of the community activists during a pupils' trip to the desert, far away from their usual living surroundings. Unconventional means of representation did not impede clear visions of "places of our own", with "a hearth for the winter", a "tea corner" and a variety of outdoor places for group activities and for personal retreat. Similar events for parents, other members of the community and mixed groups were also held.

Imagining the Project in its Place
Intuiting place is essential to place making - the condensed concretization of existential space through orientation and identification (Relph, 1976). It includes observation of natural and cultural assets and meanings, neighboring environments, edges and borders, paths and landmarks, views and exposure. Social and power relations are immediately incorporated in the actual context (McGregor, 2004). Therefore, projection of the imagined experiences in their location may enrich and metamorphose both images.

Confirming the Preliminary Image within the Community
The two above-mentioned phases must be summarized, altered if necessary, and confirmed as the established platform for future community making; a foothold that may itself undergo change, but still form an agreed upon starting point. There are many strategies or methods applicable for such an endeavor, e.g. simulation games or "open -space events" (Owen, 2008). It is important to design a process that minimizes pressure and exposes conflict, which may then be addressed openly and resolved.

Figure 7 presents members of the larger community in a role-playing game developed by the community itself. By role-playing, much of the pressure of other methods is avoided, and participants are encouraged to adopt perspectives different or even opposed to their own. This is the first step towards conflict resolution, addressing not only the built learning-environment, but also the processes and frameworks themselves that foster ongoing community making.

CONCLUDING REMARKS
Topographies and shrines is an outline for the creation of learning environments through the interrelation of three counterparts: topographies - the owned and continual space of everyday life and dwelling; shrines - the spaces for the new, the exalted, the non habitual; and making by the community - the continual collaboration of the community, teachers and pupils in the design and re-design of the learning environments. All three counterparts are profoundly context related, soundly local and of uttermost significance to identity, belonging and hence wellbeing.

It is both a "Breaking Down of the School Walls" (Horne, 2004:6), and a cultivation of "other"
spaces that are essential to learning in addition to "the voice of the street" (Horne, 2004). Combing phenomenological and scientific research, pedagogical agenda and active engagement of the local community at large, it has the potential to form the sought for pod-environment of learning: responsive, inclusive, and supportive.

In our predominantly urban world with the majority of the earth population living in 'archipelagoes of peripheries', the process of making of Topographies and shrines is a way towards community. Most urbanites have moved into their current residences from other towns, regions, countries or continents, voluntarily or driven by conflict or disaster, and are prone to move again due to the incessantly changing neoliberal economy, or for political or cultural reasons. Their life-style, induced by and regenerative of a world of flows, necessitates an anchor, even a provisory one, at least an ad-hoc community. Much might be different between the community members; still the turn towards the other, especially in the surroundings of an emerging community, is the primary turn towards the ethical: "... the welcoming of the Other by the Same, of the Other by Me, is concretely produced as the calling into question of the Same by the Other, that is, as the ethics that accomplishes the critical essence of knowledge." (Levinas, 2003:33).

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FOOTNOTES

1 Habitus (Bourdieu, 1972) is a system of semi-constant schemes of action, perception, thought, etc. The individual develops these schemes as a result, inter alia, of education (at home, at school, in social surroundings) and external conditions he/she encounters.

2 Architects and others involved in the planning and design of school buildings do not create learning environments. Teachers create learning environments. School planners are responsible for providing a space from which teachers can create effective and efficient workspaces and learning environments” (Bissell, 2004:32).

3 Functional and symbolic aspects of learning surroundings are obviously met by other architectural counterparts: morphology, skin, ornament, infrastructure, etc. All are fundamentally dependent on local context, while tectonics is a complement to any human context.

4 “Smooth space” and “striated space” in Deleuze and Guattari (1987) parallel to the differentiation between “earthwork” and “lightwork”, and hence between “topography” and “shrine”. Interestingly, the material analogy itself is inverted: smooth=air, striated=earth. Otherwise, the Deleuze and Guattari observations are applicable and enlightening for our purposes.


6 Open learning is a teaching method founded on the work of Célestin Freinet and Maria Montessori. It allows pupils self-determined, independent and interest-guided learning.

7 Phenomenology is the study of human experience. Available at: http://plato.stanford.edu/entries/phenomenology/#5.

8 Information Communications Technologies cannot substitute for poor physical conditions, and are useless if appropriate training and access are denied to pupils and staff (Timson, 2007).

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INTRODUCTION

A case study research method has been employed, profiling eight charter schools nationally and twelve charter schools locally in Indiana to develop ways to incorporate issues of curriculum, funding, and facility planning into the design of this 'new' educational building type. The primary research activities involved traveling to the selected schools to carry out place-based observations, behavioral mapping, and trace measure and physical artifact analyses. (Zeisel, 2006) Focused interviews with administrators, students, teachers, and community members of the selected charter schools helped us gather information about people's attitudes, values, and behavior. Specific lessons learned from the case studies and profiles were then used to develop, write, and illustrate design 'patterns'. A pattern describes a problem that occurs in an environment and then describes the core of the solution in such a way that it becomes useful to the human communities that the pattern supports. (Alexander, 1977) Through our research, a number of patterns became apparent: school as community center, classroom clusters, flexibility, project-focused learning spaces, user-centered learning society, leveraged technology, and the learning environment designed as a teaching tool. Ten of the fifty patterns from the well-illustrated pattern language guidebook we developed are described in this paper.

Excellent guidelines for good school design, gained from a literature review of the significant research efforts of national and local organizations, experts, and leaders in the educational field, helped to affirm and develop our design patterns. Six guiding principles, endorsed by the Department of Education, the American Institute of Architects, and the Council of Educational Facility Planners (National Symposium on School Design, n 1998) were used to clarify and organize our fifty design patterns. These six design principles, reworded for emphasis are: 1) Teaching and learning to accommodate the needs of all learners, 2) Maximize health, physical comfort, well-being, safety and security, 3) Be environmentally responsible, clean and green, 4) Be practical, cost effective, flexible, and adaptable, 5) Serve as a center of the community and 6) Involve all community interests in the planning, design and sustaining process of the school. (U.S. Department of Education, 2000)

Coinciding with the development of the patterns, upper-level undergraduate students in the Department of Architecture at our university undertook a series of nine charter school design projects. In these two, semester-long, evidence-based design studios, the patterns and case study exemplars were used to focus the students' innovative ideas. Additionally, the interdisciplinary group of students on the charter school research team served as con-
consultants to the design studio. This parallel activity allowed for the effectiveness, validity, and relevance of the patterns to be tested in the studio projects. The academic projects were based on programmatic needs and client interactions with specific charter school personnel. This connection between the development and testing of design patterns has helped in improving ways in which the pattern language guidebook becomes useful for future charter school stakeholders.

Ideas about how children learn and how educators teach have the potential to reform educational approaches and re-shape learning environments across the United States. Our society and educational system have changed radically in recent decades. Educational facility design must mirror changes in educational styles and enable new ways of learning. Differing educational missions, faculties, and student populations all require significantly different design approaches. In this paper, we present ten patterns and illustrative examples from our larger research study, essential to the design and planning of innovative and responsive learning environments in the 21st century.

**PRINCIPLE 1: TEACHING AND LEARNING TO ACCOMMODATE THE NEEDS OF ALL LEARNERS**

Charter schools provide opportunities for the design of innovative learning settings. Because their approval requires them to meet a need in school communities, charter schools often serve a specific population, target an underserved neighborhood, or provide an innovative approach to teaching (NACSA, 2007). Randall Fielding, founding director of an Internet resource for school design, makes this point clear. "Alternative education programs in the United States are established for learners that may not succeed in traditional learning environments. To reach a diverse group of learners, educators are looking at innovative approaches to curriculum, staffing, schedules, technology, and facilities." (Fielding and Nair 2007) This shift in educational approaches requires a related shift in the design and planning of learning environments.

Teacher-oriented, whole-group instruction taking place in individual, self-contained classrooms characterized the old "turf-centric" model (Fielding, 2006). Active student participation and cooperative learning in flexible, diverse and dynamic educational spaces characterizes the new model. Students work in groups of various sizes, are active learners, and move about more freely within the learning environment. Optimal use of technology and easy access to web-based information facilitates new methods of instruction, "letting teachers become guides and coaches; allowing students to analyze, evaluate, and manipulate information; and permitting curriculums to be individualized." (U.S. Department of Education, 2000)

Personalization of teaching and project-based learning are fundamental aspects of the new model. In charter schools, the educational environment has become a more open, fluidly designed setting that enables a variety of activities to occur while weaving together virtual and physical learning spaces. We have selected two design patterns and exemplars to discuss under this first principle of teaching and learning to accommodate all users.

![Figure 1. Main Level Plan and flexible studio space of Denver School of Science and Technology illustrates the charter school's multiple and varied spaces for learning.](image-url)
Pattern 1.1: Provide Different Informal and Formal Learning Settings

Create learning environments that differ in size, scale, configuration, material quality, and activity type (open learning studios, outdoor classrooms, breakout spaces, learning streets, and flexible-use areas) to provide a variety of multi-purpose spatial settings in which to learn. Design spaces to enable a range of activities from quiet, reflective personal study to large, hands-on, collaborative projects. Provide flexible, easily accessible, breakout areas where social interaction, incidental learning, and informal opportunities to discuss, display, and celebrate student work are encouraged.

Denver School of Science and Technology (DSST) is a 65,000 square foot middle and high school designed to create multiple spaces for learning. The "Commons" is a double-height, open gathering space at the entry, with administrative offices located adjacent to it. Classrooms of different sizes are organized in clusters and arranged by grade level. Each classroom cluster centers on an open studio that serves as a flexible space for team presentations, informal meeting and integrated learning activities. A shared office space allows teachers to work together when planning curriculum in cross-disciplinary teams. Adjacent project rooms provide space for hands-on, project-based learning. Outdoor courtyards, with direct access from each classroom, further extend the interior space, providing open-air learning environments. The "Galleria," a wide "learning street" (Nair and Fielding, 2005) with niches set into its length, connects classroom clusters. Used for school congregations, experiments, science fairs, and group projects, it becomes a dynamic, alternative learning space. Lounge furniture, vibrant displays, open views from walkways above, and interior windows contribute to active learning and interaction opportunities. (Great Schools by Design, 2006)

Pattern 1.2: Enable Project-Based Learning and Real-Life Experiences

Education needs to be connected to real-life applications as opposed to the traditional mastery of discrete subject areas. One of the most natural ways of learning is that of learning-by-doing coupled with an interdisciplinary instructional approach. Integrated, project-based learning supports cooperation and sharing of ideas that will enable students to develop critical thinking skills, process material better, and use the strengths of a group to increase the amount of information absorbed and decrease the time it takes to learn a lesson. Educational facilities should provide project rooms or labs for hands-on activities and exhibition spaces for the display of group and individual work.

The California Science Center Charter School in downtown Los Angeles, is located in Exposition Park, home of The Natural History Museum, The Aerospace Science Museum, and directly connected to an 80,000 square foot renovated Armory called the Wallis Annenberg Building for Science Learning and Innovation. The main hall of the Armory, known as the "Big Lab" and open to the entire community, is a daylit, two-story, multipurpose space used for a variety of hands-on science activities. Four main areas, each with a different scientific focus, make up this big lab: 1) Exploration Grove allows students to learn about ecology and...
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earth sciences; 2) Water Works allows students to study water effects with pumps, fans, objects and an armada of miniature sailboats; 3) Meg Tower allows students to conduct experiments from a tall tower by dropping balls, balloons, parachutes, eggs, and other objects; 4) Giant Wall is a wall with holes where students build structures to explore physical science and engineering. (California Science Center 2008) This adaptive reuse Armory project, easily connected to the new charter school classroom building via a series of bridges, yields multiple opportunities for inquiry, exploration, and cutting-edge science experiments, and promotes extensive project-based learning activities in the charter school's curriculum.

PRINCIPLE 2: MAXIMIZE HEALTH, PHYSICAL COMFORT, WELL BEING, SAFETY, AND SECURITY

In the past decade, concern has grown about a number of health and safety issues in learning environments, including air and light quality, youth crime and violence, and more recently terrorism. School planning and design research shows how to build safety into facility design by strategically located windows, entry points, and public gathering places. (Schneider, 2000) Schools that provide space for youth activities and after-school programs can be safer schools too, since most student violence occurs between the hours of three and six pm.

The size of the student population and scale of the school building have an effect on safety, well-being, and student performance. (Bergsagel et al., 2007) Charter schools most often create small communities of learners. This helps to maintain supervision, encourage healthy social interactions among students, teachers, and administrators, and establish a sense of community and connectedness that promotes a safe environment. Randall Fielding is convinced that "a hierarchy of spaces and groups remains one of the most vital aspects of comfort and security. Thoughtful design of the site and facility enhances the sense of belonging by providing spaces for a layered hierarchy of groups." (Fielding, 2006). Two patterns and examples of charter schools illustrate well this second principle.

Pattern 2.1: Ensure the Highest Reasonable Standards of Safety

School design should embody natural surveillance (the ability to see what's going on), natural access control (the ability to control entry and exit), and territoriality (the ability of legitimate users to control an area, while discouraging illicit users). (Schneider, 2000) Provide transparency to aid in wayfinding and develop a stimulating place to learn that contains opportunities for informal surveillance. Create a defined entry that is secure, easily visible, and protected while remaining open and welcoming.

Perspectives Charter School, located in a lower-income neighborhood of Chicago, provides an exemplary understanding of promoting safety through access control, natural surveillance, and territoriality. Designed with a circulation core at the hub of a double-stacked layer of classrooms, administrative offices, and support areas, Perspectives is an interior courtyard building with the main shared space used as a multi-purpose "Commons." The walls of this two-story space con-
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Foster a small school culture to promote a positive image and a distinctive educational mission. Students need to identify with their school community and feel a sense of belonging, common purpose, and loyalty to the place. Create intimate learning communities where students are well known and encouraged by adults who care for them. This will help to reduce the learning gap disadvantages that plague underserved student groups and the isolation felt in large, institutional settings. (Bergsagel et al., 2007)

The directors of Imagine MASTer Academy in Fort Wayne, Indiana are working with architects to create a "cottage feel" for the seven campus-style buildings of their K-8 charter school, located on what was originally a Catholic orphanage and later home to the YWCA. The campus layout gives MASTer Academy the opportunity to organize itself into autonomous small schools, clustering classrooms, teacher's offices, project rooms and flexible use spaces within each building. To create learning communities, faculty and administrators are exploring ways to group students that offer them the best opportunity to gain a rich learning experience. This may mean splitting subject areas by gender, developing multi-age level groups, looping (allowing students to return to the same teacher), or creating advisory teams (a core group of students working with an adult mentor). (Nair, 2003) Within each "schoolhouse," a dedicated space is provided. In the elementary school, this "home base" (Nair and Fielding, 2005) is a cubby area with storage space and a project table. In the middle school, locker alcoves are designed for a student community. The campus environment, with landscaping, paths, edges, and outside interaction spaces, engages the whole school as a community of communities.

PRINCIPLE 3: BE ENVIRONMENTALLY RESPONSIBLE, CLEAN, AND GREEN

Ecologically sensitive, "green" ideas are changing the design of educational environments. Randall Fielding notes, "With stretched capital and operational budgets, school organizations are looking to facilities to become more energy efficient in their daily operations. Educators are consistently interested in sustainable ideas that are not only environmentally responsible and good for the bottom line, but ultimately work hand-in-hand with the educational process." (Fielding and Nair 2007) The U.S. Department of Energy has estimated that at least 1.5 billion dollars per year can be saved through
modest energy conservation modifications in new and existing schools. (U.S Department of Energy 2008) Conserving energy becomes an economic necessity for charter schools as they make effective use of available resources.

"High performance schools" have implemented a wide range of ecological principles, including increased use of daylight, green roofs, natural ventilation, and recycled materials. (SBIC, 2008) Daylighting is an important component in improving student performance, as one well-known study indicates that students with high levels of classroom daylighting show improved math and reading test scores (Heschong Mahone Group, 2002). Studies also indicate that physical comfort correlates positively with the ability to concentrate, student attendance rates, and teacher retention. (Lackney, 2003). In the classroom, it is essential to provide excellent air quality with natural ventilation, use of environmentally responsible building materials, local heating and cooling controls, acoustic control devices, and natural and task-appropriate lighting and illumination levels. (U.S. Department of Energy, 2007)

Charter schools have the opportunity to try new "green" ideas in linking the educational process to facility design. Schools can actively teach stewardship of environmental resources through careful and conscious management of land, air, water, energy, and building materials. This helps students learn that taking care of their community is important and that their actions have an impact on the world in which they live. Additionally, a landmark study on the cost of "Greening America's Schools" shows that the 2% average premium for green buildings is well worth the benefits, which include reductions in water pollution, improved environmental quality and increased productivity of learning in an improved school environment. (Kats, 2006) For this third principle of striving to be environmentally friendly, clean and green, we describe and illustrate two design patterns.

Pattern 3.1: Maximize Use of Daylight and Natural Ventilation

Introduce daylight and natural ventilation into all learning spaces. Daylighting strategies should optimize natural light while avoiding glare, controlling heat gain, and balancing electric light. Effective use of shading devices and placement of openings and light shelves allows for greater penetration of daylight into the room. Natural ventilation strategies should capture prevailing breezes and utilize airflow patterns to circulate fresh air within the building. Consider use of operable windows, ventilation louvers, solar chimneys, and stack effect ventilation shafts.

Ben Franklin Elementary School in Kirkland, Washington is a high performance green school with abundant daylight and natural ventilation. In plan, three classroom clusters organize this 57,000 square foot learning environment into the form of an inverted E. The two-story, shared learning areas of the wings are oriented along an east west axis allowing better control of daylight. Light shelves and roof overhangs temper direct sunlight, minimize solar heat gain, and prevent glare on the south side of the building. North side openings allow indirect daylight into the classrooms and provide views toward a stand of Douglas fir trees. Courtyards between the classroom wings, landscaped with
native plants and irrigated by rainwater collected from the school's butterfly roof, provide for outdoor learning. The ventilation strategy allows air to flow by convection into rooms through low, perimeter louvers. Air is then exhausted via stack effect through a ventilation shaft. This passive ventilation strategy results in ten air changes an hour, providing exemplary indoor air quality with low energy consumption. (Sokol, 2007)

Pattern 3.2: Utilize the Learning Environment as an Educational Tool
Look at the potential of the building and environment to be used as a learning textbook. Green building features such as photovoltaic and solar panels, wind generated power, water collection systems, green roofs, and solar chimneys aide in energy and cost conservation and become excellent teaching tools in the school's curriculum. By integrating environmental aspects of the building into the program, students understand and observe first hand the principles of ecology and interdependence.

Sidwell Friends Middle School weaves together a renovated existing building with a new recycled cedar-clad building, surrounding a courtyard developed as a constructed wetland. Wastewater is processed through the terraced wetland that acts as a biological filter. The children understand this process and have prepared video documentation of its effect for their website. (Sidwell, 2008) The green roof garden insulates the building, filters rainwater used for landscaping, and provides a site to grow vegetables and herbs used in the school cafeteria. The children have access to this green roof where they tend the garden, explore the solar chimneys used for the building's natural ventilation, and discover the photovoltaic roof panels that generate power for the building's electric load. The design of each area of the building and site was established from an educational, recreational and visual perspective and refined through discussions with teachers and parents. Sidwell Friends Middle School is a great example of designing the school as a textbook of ecological learning.

PRINCIPLE 4: BE PRACTICAL, COST EFFECTIVE, FLEXIBLE, AND ADAPTABLE

Charter schools are often created within difficult economic and time constraints. Taking advantage of available materials, simple construction processes, flexible spaces, renovation and adaptive reuse of existing buildings, and alternative learning environments can create remarkably innovative and cost-effective schools. The best school designs allow for spatial flexibility and adaptability so that the mix of learning areas (individual, team, small-
Flexible, open structural systems that allow spaces to be reconfigured over time will best accommodate change. (U.S. Department of Education, 2000)

Renovation and re-purposing of existing facilities are important economic and sustainable ideas. "Existing schools should be renovated and preserved whenever possible, especially in cases where reuse preserves natural resources or valuable historic and cultural assets. Building reuse helps children and adults alike to embrace the social and cultural heritage of their community." (U.S. Department of Education, 2000) Adaptive reuse is indicative of another larger trend in creating charter schools, especially in urban areas where land is scarce. Adaptive reuse has involved the conversion of churches, movie theaters, shopping malls, and big box retail stores into schools. Finally, students today are learning in non-traditional facilities that redefine the concept of "school." From a high-rise office building, to railroad-car classrooms, to an underutilized YWCA, to a nearby zoo, alternative spaces for educating youth represent an innovative public use of various occupied facilities. Lease options available to charter schools in public places make unique and effective partnerships. Many charter school projects demonstrate that constrained situations can lead to excellent educational facilities. We present two design patterns and examples for this fourth principle.

**Pattern 4.1: Think Renovation and Adaptive Reuse of Buildings**

Explore strategies for renovation of under-utilized, existing school buildings and adaptive reuse of suitable public buildings into learning environments. When renovating an existing school or re-purposing a building with another original use, challenge the preeminence of the classroom as a school's basic "building block." (Fielding and Nair 2007)

"Bronx Charter School brings art to life in former factory" (AAF, 2005) in an adaptive reuse project in the Hunts Point area of Bronx, New York. Located in an industrial zone that has been experiencing significant growth, the school is a renovated and re-purposed 1917 sausage factory. The exterior of the building with its facade of colorful glazed bricks, celebrates the school as a place where the arts are embraced. The interior is filled with color and light from six saw-tooth skylights in a complete reconstruction of the roof. The scale, openness, detail and materiality of the Bronx Charter School for the Arts reflects a changing understanding of what educational facilities should and could be, as well as an openness to experimenting with the architectural form of schools.

**Pattern 4.2: Consider Non-Traditional Options for School Facilities**

Encourage schools to explore options for using alternative civic, retail, institutional, and other non-traditional, adaptable spaces that offer opportunities for learning. This supportive partnership of hybrid building types can be most advantageous for charter schools that do not have the ability to use existing school assets and built-in public funding. The creation of the Henry Ford Academy on the...
campus of the Henry Ford Museum blurs the line between school and museum for its 450 students. The Academy leads students to explore the world through the lens of the museum collections, setting them free on a 90-acre site that includes 82 historic buildings. Students investigate places such as Thomas Edison's laboratory and the Wright Brothers' bicycle shop as part of their project-based learning. They learn in a way that is engaging and interactive, and teaches them about how a cultural institution is run. (Bingler, 2008)

Conversely, schools are becoming centers of civic participation and recreation as they integrate shared uses such as neighborhood health clinics, after school care and adult education programs, recreation centers, and other family life support services into their context for community use. Only a decade ago, educational models were built as stand-alone instructional facilities that restricted community access and required most knowledge and materials to be dispensed from within the classroom. Today, schools serve both as symbols and centers of their communities, designed to be more open, to showcase learning, to encourage community access, and to serve a variety of community needs. We discuss under this fifth and final theme, two patterns followed by two case studies.

**Pattern 5.1: Integrate School into the Fabric of the Community**

Develop the school in partnership with local community assets, making it an integral part of the neighborhood. Extend learning outside the school into the community, sharing the wealth of the community's many learning resources. Service learning and school-to-work internships become vehicles to deliver quality programs to the recipient partners, while students gain important lessons in giving, are better prepared for the challenges of college, and sharpen and strengthen the social and technical skills they will utilize in the real world.
The Indianapolis Herron High Charter School presents supportive partnerships both with the neighboring community and local institutions. Herron High was originally funded by a start-up grant from the Bill and Melinda Gates Foundation and the Indianapolis Facilities Fund. To supplement this, the school adopted an aggressive grassroots campaign, creating a planning board to address funding the school’s operation and future expansion. (Watson, 2007) The campus-like group of buildings, including the re-purposed Art Museum, which now houses Herron High School, and the classical "Main" studio arts building to be renovated into a middle school, was originally the Herron Center for the Arts. When the arts academy moved, leaving the buildings vacant, a group of neighbors, concerned with the future of this site, met to find the best reuse for these buildings. It was decided to create a neighborhood charter school. Herron High is located in a transition area between an urban residential neighborhood and a dense commercial area, providing numerous opportunities for extended partnerships for the school. The public library, recreational facilities, and local technical and community colleges are community partners, providing support to the school. The students have an open lunch period and eat in the community as well. Preserving this neighborhood icon, Herron High instills pride in the school and community’s shared traditions, and strengthens the neighborhood’s sense of purpose, identity and coherence.

**Pattern 5.2: Be “More than Just a School”**

Make the school a community center in the minds of the citizens. Encourage community use by creating a welcoming, comfortable, and enjoyable place for people of all ages to congregate, providing spaces, times, and programs for community access to education as well as places to be used for receptions, meetings, and athletic events. Health and family life services and continuing education opportunities can all be accessible through one building, while the focus of every activity should be on the promotion of children’s learning.

John A. Johnson Achievement Plus in St Paul’s East Side neighborhood is an elementary school of 350 students. It represents a unique public-private partnership with school, recreation, and community services all located in one convenient place. Achievement Plus provides “extended learning” opportunities (such as after school and adult education programs) and “learning supports” (such as health services and housing assistance for families), by working together with many community partners. (John A. Johnson, 2008) The East YMCA, attached to the school building, provides staffing and facilities for after-school programs as well as physical education classes for the school. Eastside Family Center operates a resource center in the school that assists families with housing needs, clothing, emergency food, medical insurance and provides family nights, parenting classes, adult education, and medical and mental health resources. East Side Learning Center, a ministry of the School Sisters of Notre Dame, provides one-hour tutoring sessions twice a week for each student as well as other children in the neighborhood needing personalized learning. Saint Mary’s Hospital started a health clinic at Johnson three years ago and Children’s Dental became a recent partner as well. Because of the many programs and services offered inside the
CONCLUSION

The ten patterns we have highlighted in this paper provide compelling evidences of creative ways schools are reshaping the educational environment. New educational approaches in charter schools include promoting a small school culture where teachers have the opportunity to know students well, personalizing student's development, facilitating student-to-student, adult-to-student, and adult-to-adult collaborative interactions, taking learning into the community, and fostering active, hands-on-learning and performance-based assessment. Teachers are coaching student's development by intertwining personal and academic growth. Learning is interdisciplinary and enriched by the available learning resources within the community. School's doors open early and close late with extended seasonal hours approaching a full time, year round community learning center.

These new patterns of teaching and learning require new architectural patterns to support them. We must be creative and think beyond the traditional school of uniformly sized, forward facing classrooms, long, double-loaded corridors, isolated, teacher workspaces, and uninviting administrative offices. These recurring elements in school architecture reflect the message that “school is a place where young people comply with authorities who dispense information, not a place where they actively construct knowledge and create meaning.” (Bergsagel, 2007).

We need to see group collaboration and focused individual work areas, flexible use spaces allowing teachers and students to adapt to their learning needs, comfortable seating around movable tables, shared office space within classroom clusters, students circulating in wide interior streets with abundant natural light, and welcoming spaces easily accessible to students and community. We must confront the design assumption embedded in our schools that requires a comprehensive array of facilities and instead connect the school to its community whose assets provide facility and program opportunities. “Rather than retreat from the community,” we must “teach into it, reflecting a new philosophy of learning that emphasizes connections with the adult world.” (Bergsagel, 2007) Education is evolving rapidly and facility design and planning must be adaptable and flexible enough to create a range of educational models. We think these patterns have the ability to inspire designs that adapt for the future rather than replicate the past, and shed light on a wide range of issues that guide designers, administrators, teachers and parents to create schools that support all students in learning.

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Abstract
This paper investigates factors influencing the shaping of future learning environments. It focuses on the impact of social and cultural requirements on the sustainability of future learning environment. It argues that while today’s learning environments are shaped by yesterday’s visions, future learning environments are shaped by toady’s visions that might not be acceptable nor valid for future generations. The case of New Kuwait University City in Shedadiyah is used to illustrate how current social and cultural requirements impact the design of a future university campus and inhibit the production of a sustainable environment. Among several socio-cultural factors, the paper focuses on two significant aspects that have dramatically affected the development of the master plan for the New University City; namely separation of students’ sexes and car parking requirements. The first requirement was mandated by a parliament decree to build two separate campuses: one for male students and the other for female students. The implementation of this requirement resulted in the duplication of many educational facilities and immensely increased space and budget requirements. The second requirement reflected dependency on automobiles as primary means of transportation in Kuwait. It resulted in a necessity to allocate large areas of land for vehicular traffic and car parking. These two requirements, as well as other socio-cultural requirements, created a great challenge towards achieving the required level of sustainability. The paper concludes that while recognizing that accommodating clients’ social and cultural requirements is necessary for the application of a comprehensive sustainability strategy, these requirements might work against achieving required levels of other aspects of sustainability.

Keywords: Sustainability, Socio-Cultural Factors, Campus, Master Planning, Kuwait.

INTRODUCTION
Architects and planners are continuously faced by the challenge of how to accommodate their clients’ social and cultural needs while adhering to other aspects of sustainability. A comprehensive sustainability strategy calls for the recognitions of the three aspects of sustainability; economic, environmental, and socio-cultural needs of the users. This paper argues that satisfying clients’ socio-cultural requirements might act against achieving the sustainability goal. It analyses the impact of social and cultural requirements on the development of the master plan for the New Kuwait University campus in Shedadiyah in terms of its sustainability, in order to illustrate how current social and cultural requirements impact the design of a future learning environment and inhibit the production of a sustainable environment. The paper’s second goal is to illustrate how future learning environments are shaped by toady’s social and cultural visions that might not be acceptable nor valid for future generations.

Murning (2006) traced the development of university campuses in the West and concluded that, “we are now in what has been described as the fourth phase in the evolution of buildings for tertiary education.” For Murning, the earliest was the inception of universities, where communities of scholars integrated into the urban fabric in centers, the second was redbrick universities of the nineteenth century and the third was the post-war creation of campus environments. Now is the era of expanded access to education, lifelong learning and pedagogical changes from a teaching-based culture to a student centered learning environment for student ‘consumers’ who take a far more pro-active role in shaping their education than earlier generations.

The phenomenon of constructing new university campuses stemmed from the need to educate new generation of university graduates to serve the society. According to Halsband (2005), “the best university campuses are places that have been carefully designed over decades, even centuries.” Richard Brodhead (2004) has defined the universi-
ty as home: "a defensive structure," and a "world of belongingness thrown up against a larger world of exposure and strangeness." The university campus is a place where teaching, learning, and interaction take place.

Several developing countries are constructing university campuses to accommodate the growing need for university education of their population. Several Gulf countries, including Saudi Arabia, Kuwait, and United Arab Emirates have established governmental universities during the 60s and 70s of the 20th century. Many of these universities were built on sites previously occupied by high schools, while others were constructed on entirely new sites as complete university campuses. For example Kuwait and United Arab Emirates universities utilized existing high schools buildings, while King Abdul Aziz and Um Al Qura universities started in newly designed and constructed campuses.

One of the newest university campus projects in the Gulf region is the Education City of Qatar, an initiative of The Qatar Foundation for Education, Science and Community Development. The Education City of Qatar is located on the outskirts of Doha, the capital of Qatar, Education City covers 2,500 acres and houses educational facilities from school age to research level and branch campuses of some of the world's leading universities. As described by Salama (2008):

From its inception, the mission of the Qatar Foundation has been to provide educational opportunities and to improve quality of life for the people of Qatar and the region. This was reflected in developing a higher education campus - an education city - adopting the branch campus concept; world class universities bringing their best-regarded programs to Qatar as fully fledged partners with Qatar Foundation. This is unique in the history of education and believed to be the first such example in the world. (Salama, 2008:77)

The definition of sustainability presented by The Bruntland Report (Bruntland, 1987); "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", is accepted world wide. It illustrates the human consciousness of the historical moment and conditional existence of our generation. However, it pauses a paradox by warning against dictating future generations environments by current generations' actions. While architects struggle to achieve environmental sustainability, they depend on their clients to express their special requirements to be incorporated in the design.

Typically, clients express their requirements depending on their current visions and values that are shaped by society and culture. Clients are also increasingly requiring sustainability to be one of their projects' most important objectives. Planners, architects and designers are required to achieve sustainability through their planning and design practices. Yet, as Guy and Moore (2007) put it, "the diversity of images of what sustainable architecture might be-that is, what it might look like, where it might be located, what technologies it might incorporate, what materials it might be constructed from, and so on-is quite bewildering, and rather than diminishing over time appears to be accelerating." They argue that, "the challenge of sustainability is more a matter of local interpretation than of the setting of objective or universal goals."

The impact of learning environments on the individual has been studied from several points of view; behavioral, psychological and physiological aspects. Strange and Banning (2001) asserted that "although features of the physical environment lend themselves theoretically to all possibilities, the layout, location, and arrangement of space and facilities render some behaviors much more likely, and thus more probable, than others." Chism (2006) argues that "because we habitually take space arrangements for granted, we often fail to notice the ways in which space constrains or enhances what we intend to accomplish."

CASE STUDY: NEW KUWAIT UNIVERSITY CITY AT SHEDADIYAH

This paper utilizes the case of the New Kuwait University City at Shedadiyah to illustrate how socio-cultural requirements impact the formation of future learning environments. Kuwait University is a public university supported by the State of Kuwait. It was established in October 1966, five years after Kuwait became an independent stat. Since its inception, Kuwait University has expanded from a small institution comprised of Colleges of Science, Arts and Education, and a Women's College with 480 students and 31 faculty members, to a diversified institution with 7 campuses and more than 20,000 students and 1,200 faculty members. These campuses were not designed as university campuses but rather are converted high school buildings.
In 2003 Kuwait University acquired a 3.5 square kilometers of land south of Kuwait city. On the 25th of October 2003 the Kuwait University's Higher Committee decided to proceed immediately with the development of New University City at Shadadiyah. On the 20th of April 2004 the National Assembly approved the establishment of the New University City and the subsequent transfer of all facilities from the current campuses to the New Educational City within 10 years. An additional area of 1.5 square kilometers was added to accommodate a new medical campus. (Figure 1) The total enrollment in the new campus was expected to reach approximately 30,000 full time students by the year 2025. In addition to Kuwait University's vision of consolidating all of its educational facilities in one area, an important requirement for the new facility was the implementation of law number (30/2004) regarding the New University city and the implementation of the Kuwait Government's mandated Separation of Student Sexes (SOSS) policy. The mandate was to complete the implementation of the Master Plan over a 10 year period, with all facilities in place to accommodate students, faculty and staff. It also called for the establishment of a University City composed of 2 separate university campuses; one for males and the other for females.

To accommodate the clients' requirements, the campus master plan was conceived as a city on the banks of a river of landscape. (Figure 2) Two campuses, one for men and the other for women, were separated by a wide oasis - a "Palm Forest" over one kilometer in length. As described by the Master Plan document prepared by CCA (2006): "the campus master plan has a linear organization with key functions located at its centre or core. The ends of the Main Campus are anchored on one side by the Medical Campus and by the outdoor sports facilities on the other." The plan is comprised of two linked but separated campuses, one for men and one for women. The Main and Medical Campuses are brought as close as possible to encourage communication between them. The main student social, fitness, recreational, dining and retail facilities crucial to student life are centered in the campus. They form the heart of the campus, associated with primary entry courts and meeting spaces on both the Men's and Women's sides. Each campus is organized along a "Galleria"-a grand scale outdoor weather-protected street, urban in character and animated by student activi-
ties that link all major functions of each campus. The Galleria will give an identity to each campus creating a sense of place that will be memorable for all its students. Within the University City, college clusters will form neighborhoods bringing scale and identity to each part of the University.

The New University City will have 3 affiliated campuses, including one for female students, one for male students, and the medical campus. The college administration and academic department offices will be situated on the campus where the higher population of students for that college is. Additional faculty offices will be provided on the counterpart campus for each college (approximately 30%). The medical campus will house four medical colleges, and a 600 bed University Hospital.

The landscape work includes development of the open space system in terms of sustainability, microclimate design, planting technology and the establishment of naturalized areas around the site. Significant focus has been placed on the development of the design of the "Oasis". The design is greatly enhanced with the introduction of a water course that extends across the length of the oasis and enhanced with the palm trees grouped in clusters and is heavily landscaped berms creating a more naturalistic setting. (Figure 3) Different kinds of landscape elements have also been developed to do the work of defining streets, creating open spaces and public pathways, enhancing pedestrian ways and recycling and re-using resources. Emphasis has been placed on the use of shaded sidewalks, courtyards, canopies, arbors and other microclimate modifying spaces to increase the comfort of being outdoors and walking from parking to building, especially in the hot months. Development of appropriate dry climate approaches to landscaping has driven all landscaping aspects of the Master Plan. The extensive perimeter of the site is naturalized as a continuous cover of indigenous vegetation and swelled landforms to capture seasonal rains.

**IMPACT OF CLIENT’S REQUIREMENTS**

The client, Kuwait University represented by its Vice President for Planning Office (VPPO), conveyed the requirements of the University to the consultant. Many organizational, educational, technical, traffic, socio-cultural, environmental and site requirements were conveyed to the consultant. They included the design of the new campus to host 30,000 students.
expandable to 40,000 students and the planning for the addition of 3 new colleges in the future. Environmental requirements included consideration of harsh environmental conditions in Kuwait during the summer season and the requirement to provide mechanically air conditioned spaces for all functions. Technical requirements included the provision of all campus services through an underground services tunnel in order to avoid interruption of educational activities. Socio-cultural requirements, considered of high priority, included provision of spaces for students’ social activities, religious facilities, extracurricular activities, etc. The two main requirements the client requested to be carefully met in the new Master Plan were: the separation of students’ sexes and the provision of ample car parking for the university population. Another important requirement was to provide an architectural image that reflects Muslim and Kuwaiti identity.

The separation of students’ sexes was a mandatory requirement that should be met, as stated by the parliament decree for the establishment of the New University City. Prior to the parliament decree #24/1996, Kuwait University did not have to apply separation of students’ sexes. Since 1996, Kuwait University is applying separation of students’ sexes on classes and time schedule level. The 1996 law required banning the mixing of the sexes in classes, libraries, cafeterias, labs and extracurricular activities at Kuwait University. According to the Bulletin of Committee to Defend Women’s Rights in the Middle East (2002), “the cost of segregating classes is estimated at more than $180 million.” The application of the separation of students’ sexes since 1996 reflects the Islamic conservatism movements currently taking place. Since its independence in 1961, Kuwait was considered one of the most liberal countries in the Gulf region, but since its liberation in 1991 the conservatism Islamic movement is on the rise - and the segregation law is just one its consequences.

Separation of Students Sexes

The requirement to separate students’ sexes was achieved by providing duplicated college facilities separated by a green oasis. (Figure 4) This strategy resulted in a dramatic increase in the required areas for teaching facilities and staff offices. 30% extra staff offices were allocated in the men’s campus to facilitate temporary accommodation of staff members during office hours. Undergraduate teaching laboratories and instructional facilities had to be duplicated to facilitate easy access for both sexes. Non-duplicated facilities, that include expensive and research laboratories, created a design problem for college designers. The designers of new College of Engineering and Petroleum proposed the elimination of the central oasis to place the non-duplicating facilities, a major departure from the original master plan of the campus. The
non-duplicated facilities were finally placed in the basement underneath the college.

**Automobile Dependency**
Currently, neighborhoods hosting university campuses are suffering from the amount of automobile traffic and car parking congestions created by university students. Over 90% of the student and teaching population currently travel to the University by private car, mostly unaccompanied by others, with the remaining 10% equally split between passenger and being chauffeured. Traffic of this scale produces traffic congestions, air pollution, noise and disturbance levels. This trend is likely to continue unless the University can offer real incentives for students and staff alike to utilize more sustainable modes of transport.

Traffic studies suggested that the new University could generate over 13,000 journeys in the network in the afternoon peak hour, leading to high traffic levels and potential congestion at key road junctions on the 6th and 7th Ring Roads. An internal ring road was designed inside the campus to accommodate the expected heavy traffic around the colleges. The Master Plan provided 33,423 car parking spaces to accommodate students, faculty members and staff parking requirements that covers an area of approximately 1/3 of the total area of the site. (Figure 2)

Kuwait University faces a considerable challenge with regard to the use of sustainable transport modes. The predicted volumes of traffic may also impact significantly upon global environmental issues such as climate change. Parking and traffic impacts off the campus are recognized within the university as being the most widespread source of conflict between the university and local residents.

The magnitude of these conflicts can be reduced by implementing strategies that reduce the use of vehicles for accessing the campus.

As little can be done to influence the wider climate in Kuwait, the University must focus on instilling a more positive attitude towards public transport, and discourage unaccompanied car travel. This may be achieved through a combination of public transport infrastructure improvements, technological innovation and financial incentives. The success of achieving sustainability objectives throughout the University will be dependant, in part, upon, the cultivation of leaders to champion campus environmental responsibility, as well as the allocation of resources necessary for its implementation. Without supportive leadership, campus sustainability efforts are likely to have difficulty in attracting the resources and compliance they need to achieve the desired sustainability objectives. The University can play a major role in changing the car-based culture that currently dominates Kuwait. By initiating a shift towards sustainable transport modes the University may enhance its image as a leader in environmental sustainability practice and innovative design.

**CONCLUSIONS**

This paper discussed how clients' socio-cultural requirements affect achieving sustainable future learning environments. Kuwait University New University City in Shedadiyah was used as a case study to illustrate of how specific socio-cultural requirements influence the formation of a future learning environment. In the case of Kuwait University new campus in Shedadiyah, two main
requirements conflicted with the requirement to achieve sustainability in the built environment, namely the separation of students’ sexes and automobile parking requirements.

The separation of students’ sexes was achieved by creating two separate campuses one for male students and the other for female students. Many educational facilities and services were duplicated that required an estimated increase of 30% of the project cost, working against achieving economic sustainability. The provision of more than 32,000 car parking space for students, faculty members and staff mandated the occupation of more than 1/3 of the site by parking areas, working against achieving environmental sustainability. The master plan attempted to solve this problem by providing an environment within the campus that encourages walking by providing shaded and pleasant walkways between colleges.

Dependency on car and the segregation of students’ sexes affected the need for space and spatial distribution of campus facilities. The Master Planner attempted to create a place that focuses on the student as the centre for learning; these social and cultural requirements affected negatively the creation of a sustainable environment in terms of economic and environmental sustainability. The paper concludes that while recognizing that clients’ social and cultural requirements are essential for the application of a comprehensive sustainability strategy, they might work against achieving other aspects of sustainability; namely economic and environmental aspects.

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DOES PLACE REALLY MATTER TO STUDENTS WITH LEARNING DISABILITIES?
A Study of Three University Campuses

Susan Whitmer

Abstract
Key drivers that influence space design in today's higher education environment are technology, changing demographics, increased focus on student engagement, and carbon footprint. Just as important, but not typically on the list, is the growing population of students with Learning Disabilities (LD) for which the physical environment plays an increasingly important role in successful learning outcomes. The research goal was to examine the role of "place" as a component of academic success for those students with LD. Methodology included both literature review and the development of a case study analysis of three post-secondary institutions in the United States. The universities were chosen based on the size of the university, the campus setting, and the mission of the Disabilities Services team. The conclusion of the research surfaced three specific components of the physical environment that hold an increased value for a student with LD. These components are wayfinding, formal learning spaces, and disability services spaces. The key to integrating a sense of place with the needs of students with LD is moving beyond meeting the minimum standards of the legal mandates and bridging the principles of universal design to the built environment.

Keywords: Accessibility; Inclusive Design; Learning Spaces.

WHAT WE KNOW
For many young adults the transition from adolescence to adulthood often coincides with their introduction into higher education, which can prove to be a life-altering event (Chickering & Reisser, 1993). Students with Learning Disabilities (LD) have added challenges and pressures to overcome during this transition. Colleges and universities are the places where students forge new relationships, test their autonomy and identity, explore their values, develop the path for their career goals, and ultimately create a successful academic experience (Strange & Banning, 2001).

It is easy to overlook the significance of place in creating environments that foster success among students with Learning Disabilities (LD). For most, place (environment) is ambiguous unless, of course, it distracts us from our daily activities or our thoughts.

Emerging Trends
The U.S. Department of Education acknowledges that the importance of higher education has dramatically increased as our society continues to become more knowledge driven. A Commission appointed by the U.S. Secretary of Education (2006) reports, "Ninety percent of the fastest-growing jobs in the new information and service economy will require some postsecondary skills and credentials". This report identifies job categories that require on-the-job training alone as the jobs that are expected to have the greatest decline. This is important because on-the-job training jobs historically have been the types of jobs that were most available to people with disabilities.

Since the enactment of Section 504 of the Rehabilitation Act in 1973, the population of students with disabilities in postsecondary education has increased substantially. The act made it prohibitive to discriminate on the basis of disability and protects the rights of individuals with disabilities in programs and activities including education. These opportunities have resulted in the population of students with disabilities doubling between the years 1987 and 2003 (U.S. Department of Education, 2006), which indicates a positive trend in educating students with disabilities. Students with disabilities who graduated from secondary institutions were three times as likely to enroll in higher education programs as their non-disabled peers (Brown, 1992). Students with learning disabilities represent as much as one-half of this cohort.

So what are the demographics of students
Does place really matter to students with learning disabilities? A report by (Henderson, 2001:22) outlines the following statistical profiles of college freshman with learning disabilities:

- Most likely from families whose income exceeded $100,000
- Have parents with college degrees
- Earned "C" or "D" averages in high school
- Expect they will need extra tutoring
- Consider majoring in Arts and Sciences and are least likely to be interested in professional fields
- Rank themselves lowest in math ability, intellectual self-confidence, academic ability, and writing ability

Medical, Legal, and Social Models of Inclusion
Historically, accommodations for disabilities were viewed by society strictly as a medical condition. The tireless work of Ed Roberts, a post-polio quadriplegic, who studied at the University of California at Berkeley, focused on the social models of disabilities. This led to the enactment of Section 504 of the Rehabilitation Act of 1973 which provides that (Shapiro, 1994):

> No otherwise qualified handicapped individual in the United States as defined in section 706(8) shall, solely by reason of his handicap, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program receiving federal financial assistance …

The Individuals with Disabilities Education Act (IDEA), a second important piece of legislation was enacted in 1990. This legislation, according to Lissner (1997) impacts higher education because it opened doors to the college aspirations of students and led to increased attendance into post-secondary education by students with disabilities.

The Americans with Disabilities Act, also enacted in 1990 states that there can be no exclusion on the basis of disability. Lissner (1997) identifies the primary difference in the two pieces of legislation as coverage. Section 504 covers entities that receive federal funds and ADA covers private entities. A fundamental difference in the intent of IDEA and the other pieces of legislation that impact higher education is that IDEA requires the primary and secondary educational institutions to identify the disabilities and provide accommodations. Higher education institutions do not have that mandate. In post-secondary, it is the responsibility of the student to notify the school of the disability.

Lynch and Gussel (1996) identify the notification of a disability as self-advocacy. Self-advocacy is described as a necessary life skill for students with disabilities. Once a student has developed the skill of self-advocacy, he or she is more likely to disclose disability related needs and limitations; understand alternative accommodations (note takers, technological devices, private test taking rooms, etc.); understand how such services will enhance their student experience; become more independent and less socially isolated; and provide a successful transition through the college years into employment (Roessler et al., 1998).

Creating socially inclusive environments that address the needs of all students on a campus is a challenge under the best circumstances. Architect and educator Ron Mace developed a passion around designing environments and products that focus on a socially inclusive process. His work during the 1980s at the College of Design at the North Carolina State University provided a platform for developing a process of designing environments and products that enable human function and behavior. This process became known as Universal Design (Ostroff, 2001; Thornton, 2006). There are other terms used interchangeably with universal design such as barrier-free design, accessibility, and inclusive design. The concept of universal design is based on minimum standards that create good design, regardless of who the user of the product or built environment is. Understanding the value of social inclusion in design requires an understanding of the key principles of universal design developed by Mace.

An important component of universal design, particularly in large institutional environments is wayfinding. Literature on the relationship between wayfinding and the built environment is scarce. However, the literature that is available confirms the value of wayfinding in providing elements for recognition, reassurance, and routine in human activity. Two of the elements of wayfinding, recognition and routine are integral factors in managing a learning disability by creating uniform patterns of activity in the environment.

Unfortunately, the majority of attention that is given to universal design is in context of government legislation and regulations instead of social inclusion. While the work of Ron Mace certainly was an influence on the Americans with Disability Act of 1990, Ostroff suggests this misconception has led to “thoughtless new designs which end up looking like retrofits” (Ostroff, 2001: 1.5).
So how do we get back to designing architecture that more closely follows the philosophy of Ron Mace? Salmen and Ostroff (1997:6) suggest, “designers must listen to and hear from perceptive spokespersons who can articulate the needs and responses of people of all stages of life.” One important determinant for this issue is attitudinal. There are those who believe that our society focuses too much attention on accommodating the students to conform to a disabling environment rather than enabling the behaviors of the students by creating learning environments that are not mismatched (Thornton, 2006).

### Place and Student Engagement
Strange and Banning (2001:141-142) identify four dimensions of the physical environment that directly relate to student involvement:
- Campus location
- Human-scale design
- Layout
- Flexibility.

Regarding location, whether the campus is located in a small remote area or a large metropolitan area, there is always opportunity for involvement and engagement of students. The second principle of physical environments, human-scale design, describes physical environments that allow students to be comfortable with and confident in their environment. A human-scaled environment is smaller in scale and permits small group interactions. Smaller residence halls with areas for student-student or student-faculty interactions are prime examples of human-scaled environments. It is also possible to create smaller human-scaled communities within a large campus. The third and fourth principles of the physical environment explained by (Strange & Banning, 2001:145) involve design layout and flexibility. Spaces that provide an impetus for social interaction are described as “societal” or “socially catalytic.” Those encourage impromptu interaction, such as lounges with comfortable furniture, wide hallways, and side stairwells; and meeting facilities with space dividers that permit the creation of small, quiet gathering spaces (Strange & Banning, 2001:309). Providing flexible spaces that accommodate a variety of users and activities increases the probability of involvement.

### RESEARCH METHODOLOGY
The case study approach was determined to be the most effective process for confirming the theoretical position. Three universities were chosen based on student population, disabilities philosophy, and solutions. The procedure for the research was designed to evaluate each of the three case studies through the following research methods:
- Observe the campus surroundings by visiting the campus physically or virtually and document observations
- Prepare a questionnaire and have the questionnaire submitted to the population of students with LD through respective Disability Services offices. Once questionnaires were returned, the qualitative data would be ana-

### Principles of Universal Design

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<tr>
<th>Principle</th>
<th>Description</th>
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<tbody>
<tr>
<td>1. Equitable Use</td>
<td>The design is useful and marketable to people with diverse abilities.</td>
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<tr>
<td>2. Flexibility in Use</td>
<td>The design accommodates a wide range of individual preferences and abilities.</td>
</tr>
<tr>
<td>3. Simple and Intuitive</td>
<td>Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.</td>
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<tr>
<td>4. Perceptible Information</td>
<td>The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.</td>
</tr>
<tr>
<td>5. Tolerance of Error</td>
<td>The design minimizes hazards and the adverse consequences of accidental or unintended actions.</td>
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<tr>
<td>6. Low Physical Effort</td>
<td>The design can be used efficiently and comfortably and with a minimum of fatigue.</td>
</tr>
<tr>
<td>7. Size and Space for Approach and Use</td>
<td>Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user’s body size, posture, or mobility.</td>
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Box 1. Seven Principles of Universal Design
Copyright © 1997 North Carolina State University, The Center for Universal Design, NCSU, Raleigh, NC.
Does place really matter to students with learning disabilities?

We know from the work of (Kuh et al., 2007) that place does in fact advance student engagement and student success. What role place plays in the success of students with LD, how place might enable or hinder success and why these serve as the theoretical boundaries for the three case studies evaluated in this research. These boundaries were developed around five specific threads in the relationship between place and student success:

1. Wayfinding
2. Safety and security
3. Engagement in the learning spaces
4. Engagement with other students and faculty
5. Accommodations for disability

University A is a large Catholic university in central United States. It is located just outside of downtown area on approximately 125 acres. The university has an enrollment of over 10,000 students of which more than 6,600 are undergraduate students. A majority of the undergraduate students live on campus. Education at University A is about creating a community of scholarship, leadership and service. This focus on community is significant to student success according to members of the Disabilities Services team at University A. University A serves more than 350 students with disabilities. It is estimated that as many as 80% of the reported disabilities are learning disabilities. Serving students with disabilities plays a strategic role at University A. The Disabilities Services team is located in the Library Learning Teaching Center (LTC) within the library. The LTC is designed with small studios that are used for classes and group study areas. The pathways that connect the studios to offices and the café provide opportunities for impromptu student-faculty connections as well as areas for contemplative study. The space also includes a learning lab which provides an extensive collection of assistive technologies. These same assistive technologies are also available in specific areas of the school's library.

University B was founded as a school for teacher training. Teaching is still a major portion of the curriculum at this university. University B enrolls more than 24,000 students and has the largest enrollment of undergraduate students in the area. The campus is located in the mid-southern region of the United States, and the topography of the campus is very flat. The property sits on 504 acres and consists of 137 buildings. University B represents an unusual model of relationship between students with disabilities and the school. Students with disabilities are recruited and are considered the best and the brightest. Currently University B has 1,010 students who report disabilities. It is estimated that over 45% of those are learning disabilities.

University B's approach to disability services is in the Adaptive Technology Center (ATC) located in the library. The programs and adaptive technologies offered at the ATC are part of a portfolio including more than thirty items. In addition to providing programs at ATC, the university has a campus wide accessibility goal of adding technology to other areas of the campus particularly in Learning Labs throughout the campus.

University C is a major public institution and is the flagship campus of a large university system located in central United States. University C has an undergraduate student population of more than 33,000 students. Students who are accepted at this university tend to be top performers. The university is academically selective in the admissions process with an average student ACT score of 26.4. Approximately one-quarter of the students live on campus. The Office for Disability Services (ODS) at University C employs up to 17 permanent and part-time employees depending on the schedule. ODS spends a lot of resources converting textbooks, exams and other print material into audio output for those students who may have visual impairments and for those with learning disabilities. They also provide reading and writing enhancement software such as WYNN, Dragon, Open Book, and E-Text. In addition to providing services to students, ODS has developed an award-winning training curriculum for faculty and administrators that consists of five modules.

Because of the diverse characteristics of the participants in the study, ethical consideration was central to how the study was conducted. Confidentiality for students with disabilities is foremost in the practices of all services provided by the schools particularly in the area of disability services.
Disability services and Research Compliance Officers are very careful to make certain that there is appropriate attention paid to upholding the confidentiality requirements. To this end, measures were taken at every step to ensure that no student names were used and no staff members were referred to by name unless permission was granted in writing.

**KEY FINDINGS**

The case study approach to the research provided an opportunity to compare the results of the observations of each university, as well as the responses to the questions posed to each of the groups. Since none of the architects were part of any particular university staff, the analysis of their responses provide additional viewpoints and to substantiate the views of those employed by the universities.

**Observations**

There were three specific observations to be made during the campus visits. The first was how approachable the spaces were that provide services to students with learning disabilities. The second was the attention paid to meeting basic human needs. This included comfort, lighting, and scalability. Meeting basic human needs is important since much of the accommodation for learning disabilities is focused on extended test time. The third was accommodation through the use of technology. Although there is extensive technology available to aid students with learning disabilities, much of the technology hardware is still cost prohibitive to students on an individual basis. Therefore students spend a great deal of time using the available technologies in these spaces.

The website for all three universities includes well defined virtual maps of the campuses. The use of technology as a form of wayfinding is becoming increasingly important for all visitors and students, particularly those with disabilities. As with any form of technology, it is critical that the virtual sites follow universal design principles. An example is found on one of the sites. When scrolling the mouse over a building, the building is highlighted in blue. This was a bit difficult to read even though a description of the building appears. Realizing this feature existed took a couple of visits to the site. The best example of a virtual site that is specifically built to universal design has been developed by the Disabilities Services team at University C. This site, still under development, will provide students with disabilities alternative routes from building to building depending on their specific needs.

Two of the campuses followed a quadrangle layout of campus planning which provided basic order to the space. There was no sense of identifiable wayfinding features on any of the campuses, however. Lack of adequate signage made locating the offices for Disability Services a challenge at each location. The locations of the spaces sent a clear message that the Disabilities Services office is a place that is isolated and in some cases hidden. The LTC at University A provided the best example of planning for the basic needs of the students. The study spaces were comfortable and provided quiet spaces for studying and taking tests. Because of the location of the LTC, there was a lack of daylighting especially in the assistive technology space. This appeared to be a common theme throughout. The spaces where the assistive technology was located had an "equipment room" aesthetic at all three universities.

**Student Perspectives**

As expected, the need for privacy for students with LD created a challenge for obtaining responses to the student questionnaires. The student response was very low in both universities B and C. As a result, it is probable that some of the responses were skewed because of the size and scalability of the different campuses. Even so, there were a number of findings that surfaced from the responses. The responses are tied to the five threads (wayfinding, safety and security, engagement in the learning spaces, engagement with other students and faculty, and accommodations for disability) that are central to the theoretical boundaries for the three case studies. Figure 1 outlines the key findings reflected in the student responses.

**Disability Services and Administration Perspectives**

The interviews with the Disabilities Services teams provided validation to much of the literature review. All three teams stated that the leading learning disabilities advocated are reading and math comprehension. The number one accommodation is extended time for test taking. The desired outcomes for the majority of students with LD are not that different from the general population of students. One of the biggest obstacles noted is that most students have to take their consistent way of getting information and place it into the inconsistency of college. It is clear that there are no special
considerations or assistance to a student with LD unless and until that student self-advocates their need. There are many students who either do not know of their own disability or do not want to be labeled as having a disability. All three administrators were clearly connected to the relationship between campus planning and student success. There was consensus around the belief that more attention needs to be paid to universal design concepts in campus planning. All agree that expanding campus awareness of the impact of space on learning, and the obstacles to learning that some spaces create for students with learning disabilities is very important. The administrators also agree that more attention should to be given to technological solutions as there are always physical space implications for technological solutions.

Architect’s Perspective

Three themes surfaced from the interviews with the architects. First, there was a consensus that there is not enough discussion about learning disabilities in the planning process. The second is that it is not common practice to have a representative of the Disabilities Services team on the design planning team, but all agree to do so might bring a new consciousness about the needs of the group they represent. Thirdly, all agree that flexibility and adaptability are key words in the creating spaces that facilitate deeper learning. The obstacles that the architects face in accomplishing the task are standards and budget.

CONCLUSION

There are three specific components of the physical environment that hold an increased value for a student with LD. These are: wayfinding; formal learning spaces, and disability services.

Wayfinding

For the student with LD, the legibility of the university campus is not only instrumental in the development of the sense of well-being, safety, and security, it also provides the critical need for orientation, recognition, and routine that is so important to this student population. The research indicated that for the students at the University A, wayfinding played a positive role in that students felt safe and oriented. And because they were part of a community, they developed a routine. It is clear that there is work to be done in wayfinding as many of the students felt the LTC was difficult to find. Since this is an important element for student success on this particular campus, better wayfinding could increase the potential for success.

Formal Learning Spaces

The research indicated that there were three factors that were important to the participating students in the classroom. One is providing the opportunity for a flexible learning environment. Over 90% of all of the students who participated in the questionnaire stated that they prefer a more collaborative learning environment over the rigid lecture-only environment. Providing flexible spaces for students with LD is particularly important in the development of life skills that will help them to flourish in a world outside of the university environment.

The second factor is providing effective natural lighting. Most of the students felt that this helped them stay on task and focused. Lastly the students indicated that comfort was key to staying focused whether that be comfortable seating or temperature in the space.

Disability Services

Disability Services really encompasses three areas of service: administrative offices, assistive technology space and spaces for extended time for test taking. The key factor for all of these spaces is location. It is fundamental that the DS office be centrally located so that students are able to easily find the resources that they need to be successful. The same holds true for that assistive technology space. Ideally these spaces would be located in areas that
are available for other services. Having a general space that provides a menu of student services helps the LD student feel less insolated or self-conscious. The charge of the architect is to create a space that balances the need for community with the need for respect of privacy. Of course, the concepts of universal design would help to achieve this task. As assistive technology becomes mainstream, the need to have a "special" location will become less of a necessity. Many of the software programs are available to individuals today. The goal would be for every student to have the technologies available for learning anytime, anywhere.

For the spaces allocated for test-taking accommodations, attention must be paid to the design of the spaces including adequate lighting, good ventilation, and comfortable furniture. Interviews with the architects indicate that evaluating these spaces is not currently part of the design process.

It is not plausible that architects and designers are ever going to fully understand all of the many types of disabilities that are part of the lives of many students in post-secondary education. It is critical that all of the stakeholders recognize this and work to ensure that someone with an understanding of these disabilities is an active participant in the design process all the way through post-occupancy. Until this point is recognized by both the post-secondary leadership and the architectural community, the needs of the student with learning disabilities will not be met and the full potential for student success will remain an unknown.

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INTRODUCTION: DESIGN INTENTIONS AND USERS RESPONSES

To explain their work to others, architects typically develop statements that clarify their design philosophy, intentions, and the imperatives by which they pursued their design tasks. In many cases however, these statements fail to reflect or address a major component—that is people or users. They are basically written—and the project is still on paper—to highlight the merits of the design while illustrating the skills of the designer or the design team as manifested in the final built form. In generic terms, architects' statements emphasize their complete awareness of cultural, environmental, and perhaps economic constraints, but users are always in the shadow, and are simply taking a back seat. If they are addressed, the norm is that they are mentioned in a superficial manner. As this argument may be seen by some architects and designers as arbitrary or too general, I reflect here on Qatar University Campus in terms of what were the design philosophy and intentions as stated by its architect and how users comprehend it, see it, and actually use it.

With the participation of UNESCO a preliminary study was launched in the early seventies to explore the establishment and creation of a higher education system and supporting facilities for the state of Qatar. It resulted in a core project representing the first phase of the academic buildings in the now completed Qatar University campus. The late Kamal El-Kafrawi, the then Paris based Egyptian architect was the prime design architect of the master plan and all campus buildings. Inaugurated in 1985 with less than 1000 students, the students' population in 2008 reached a little less than 10,000.

Since its inauguration, the project has received considerable coverage in both printed and online media and was described and analyzed in international and regional publications. Strikingly, most publications portrayed the project in a manner that goes along with what the architect has actually mentioned in his statement about the campus planning. The methodology adopted is multi-layered in nature and incorporates a wide variety of assessment techniques; including walk-through evaluation and direct observation, behavioral mapping, and survey questionnaires. The investigation reveals a number of problems that may hinder the performance of different types of QU campus users. The paper concludes that by recognizing how well university campus outdoor spaces respond to the needs of faculty, students, and staff, one can recommend ways of improving the outdoor environment necessary to facilitate the work and learning experiences of different users within the campus and the desired student-faculty interaction.
tioned in the architect's statement met users' expectations? These questions are in essence the core of my argument. It is my firm belief that these writings contribute to superficial judgments about the project while placing high value on the formal aesthetics of the campus, but discussing its occupants and how they use it is oversimplified.

On the contrary, post occupancy evaluation-POE-studies have proven tremendously successful to the clients and owners of various building types. At the international level, many studies have addressed the problems associated with educational facilities (Lackney, 1994; Sanoff, 1994 & 2003; Nasar et al., 2007; Fisher B. and Nasar J.L. 1992 a and b.; Preiser W.F.E and Nasar J.L. 2008). However, very little is known about the performance of university campuses and in particular the performance of outdoor spaces within. At the regional level, three notable studies were conducted by Mahgoub (1998), Abu-Ghazzeh (1999), and Gabr (2002), they all addressed issues that pertain to the quality of educational and support spaces but with little attention to outdoor spaces. In all cases, these POE studies offer likely objective results that continuously indicate the need to fully understand users' comprehension, perspective, behavior, and perception of the learning environment and the associated physical spaces.

OVERVIEW OF THE LITERATURE ON CAMPUS OUTDOOR SPACES

In their classical work titled People Places: Design Guidelines for Urban Open Space, Marcus and Francis (1998) argue that "a search for the published literature on how campus open spaces are used (or indeed how campus buildings are used) proved to be a thankless task." In their writing, they argue that there was little recognition of the need for visually pleasing casual gathering places. As well, day-to-day experience of passing through and using the spaces between buildings was seemingly of little consequence (Marcus & Francis, 1998). Several case studies, and conference proceedings appeared in the 1960s, paralleling the increase in college enrollment and campus construction. But there is little in these texts to aid the designer of campus open spaces. Expectedly, their focus is on fiscal issues, educational policy, and large-scale master planning (Marcus & Francis, 1998).

In many of the books on campus planning, the approach is to discuss buildings rather than outdoor areas for gathering (Crookstone, 1975; Dober, 1992 & 2000; Patterson, 1966; Schmertz, 1972). The approach is nevertheless architectural, focusing on outdoor spaces as form-giving elements appraised for their historic symbolism or aesthetic qualities, with minimal reference to how these spaces might be perceived, valued, and used by actual users who make up the population of a campus environment. The lack of concern for outdoor spaces in the literature on campus design is unfortunate. For most campus users, the campus landscape is critical in providing an imageable milieu for campus life. It should be noted that some of the gaps in the literature on campus outdoor space use are beginning to be filled by studies written by students and faculty at schools where post-occupancy evaluation is part of the curriculum (Sanoff, 2003; Nasar et al., 2007; Aydin and Ter, 2008).

The preceding overview of the literature fosters the premises upon which this research is based. While it outlines the need for and the value of POE studies, it signals the lack of studies and interest in campus outdoor spaces. As well, it sheds light on the issue of how it looks versus how it works, an issue that continued to be ignored in architectural and design practices of campus facilities for several decades.

DESIGN FEATURES, ARCHITECT'S STATEMENTS, AND PRELIMINARY OBSERVATIONS

A brief analysis of the project (on paper) reveals the core concepts and the design intentions of the architect. Academic buildings are planned within a ring road with sports and ancillary facilities to the outside (Figure 1). The concept for high quality concrete buildings in a modular low-rise has allowed the use of repetitive pre-cast elements for both clad and structural walls. The layout of academic buildings is based on grid forms, an octagon 8x4 m in width and a square with sides of 3x5 m. The octagons are adjacent and connected with squares to form the modular pattern. Each octagonal classroom module is linked to at least two 'lobbies'. One lobby can be used either as an entrance and a transition space between classrooms or an additional but secluded classroom space, the second lobby as a source of natural light and a meeting place (Figures 2 & 3).

The octagonal units are surmounted by wind-tower structures to provide cool air and...
reduce humidity. Towers of light are also introduced and are intended to control the harsh sunlight, and abundant use of mashrabiyas and some stained glass also serve to mediate the environment. Open and partially covered courtyards, planted and often with fountains, are plentiful throughout the site. The architect put strong emphasis on natural ventilation, one of the many links in which he relates to traditional architecture of the region. As specific models he used the few still existing wind-tower houses in Doha and modernized the basic principles (Figures 4 & 5).

Figure 1. The Master Planning Concept of Qatar University Campus: Enclosing Academic Buildings in a Ring Road. (Source: Archnet)

Figure 2. The Use of Repetitive Pre-cast Elements for Both Cladding and Structural Walls, A Major Design Feature that Characterizes the Design of All Educational Buildings. (Source: Salama, 2008)

El Kafrawi Statement on Qatar University Campus Representing Good Design Intentions

The octagonal room plan has been employed for several reasons. A convenient support for the square wind towers and towers of light, the octagonal form also minimizes heat absorption by shortening the period of time the sun shines on any given side.

Not only are the Tower of Winds a substitute for mechanical ventilation and air conditioning in case of power failure, but they also characterize the outline of the University buildings and relate to the cultural environment.

Architecture is a tangible expression of a civilization, the product of the intellectual, social, economic and political activity of a whole people; construction technology is simply the tool with which to give form to this expression. One has therefore closely to analyze the environment of villages, towns and cities in the Arab world, to determine the effects of Western contemporary architecture. Since the technology has been applied without the philosophy which underlies it, the modern buildings are foreign to the area, which shows how far Arab architecture has lost direction, and the profound effect this has in the individual and his environment. One has to reconcile the immediate need for the import of modern technology with the needs also to adapt it for use in the local environment. This implies considerable study of the needs and aspirations of the individual.

As philosophical principle in the design of the university, I posed this problem of the conflict between local culture and imported technology to experts in various disciplines. I would suggest that education in the effects of the conflict should be a principal aim of the new University of the State of Qatar.

I am to extend the way in which traditional values and lives are expressed architecturally, so as to strengthen the psychological link with the Qatar character, and ensure a sense of continuity in the modern environment.

Box 1. El Kafrawi Statement on Qatar University Campus
By investigating some of El-Kafrawi’s statements shown in Box 1: one can confirm that they correspond to the description of the project (on paper) (El Kafrawi, 1992).

What do the statements outlined in Box (1) tell us? They basically convey that El-Kafrawi had a number of good intentions in terms of trying to react to climatic conditions, mandates of architectural expressions while attempting to address the dialectic relationship between modern technology and local character. However, while the human component (users/people) is relatively visible in these state-
ments, it appears that it is superficially addressed. In essence, users’ expectations have not been met, especially when relating these statements to the current reality; one can confidently indicate that there is a dramatic gap between the two. Simple observation suggests that a number of shortcomings exist. The site is confusing where many faculty and students have difficulty reaching their destinations although some have been on campus for several years; classrooms are entirely dark and rely completely on artificial lighting; wooden mashrabiya windows are affected by the weather condition and the ferocious sun rays and now cannot be opened despite the continuous maintenance; the air conditioning system is used almost throughout the year because wind towers are not utilized any more. This was based on a decision of the university administration to close them all due to the amount of dust entering all the spaces through them. The list of shortcomings is endless and obviously good design intentions were not enough.

Focusing on campus outdoor spaces preliminary observations show that the original purpose for which they were created seems to be unsatisfied. Strikingly, no attempt has been made to systematically evaluate their performance with respect to the use of the university community. On this basis, the current assessment study is undertaken to objectively develop some reliable results on how campus users perceive, comprehend, and actually use these outdoor spaces.

ASSESSING OUTDOOR SPACES OF QATAR UNIVERSITY CAMPUS: A MULTILAYERED METHODOLOGY

A multilayered methodology is utilized to develop reliable results. It includes direct impressionistic observation and walkthrough evaluation, survey questionnaire, and behavioral mapping studies of key spaces. It is recognized that there is a high value of utilizing a comprehensive multi-layered methodology with multiple feedback mechanisms. Such a value can be exemplified by the avoidance of any shortcomings of using a singular method and thereby reaching more reliable results.

Walkthrough Evaluation

The first step in this process involved direct observation which was undertaken for two reasons; the first is to identify key issues to be explored by using other methods and tools, while the second is to verify the responses received. Direct observation involved touring the outdoor spaces several times within the older part of the campus while documenting the tour by photographing key spaces, key positive aspects, and demerits found in the spaces.

A total number of 24 aspects are identified and categorized under three sets of issues that are believed to have direct relation with the quality of the outdoor spaces. They included contextual and massing, interface and visual appearance, and way-finding aspects. Each category includes a number of questions/checklists that are scored in terms of their degree of appropriateness using a five point scale, where (1) represents the lowest degree of appropriateness (highly inappropriate), and (5) represents the highest degree of appropriateness (highly appropriate). Notably, some of the underlying issues of a category of checklists overlap with issues under another category. For example, some aspects underlying the visual appearance may overlap with similar aspects underlying massing. Also, some aspects underlying contextual aspects may overlap with similar aspects underlying way-finding.

The walkthrough evaluation checklist was given to 65 students to rate the issues according to their experience of the campus. However, they were requested to concentrate only on the outdoor spaces within educational buildings in the old campus area, as well as the walkways and spaces connecting the educational buildings with other support buildings. These included the colleges of Art and Sciences, Education, and Engineering. Participating students were randomly selected, but the majority of participants were enrolled in classes I have taught during the fall and spring semesters of the academic year 2006-2007. The total number of responses received was from 58 students. It should be noted that I as a researcher and user have conducted this evaluation procedure in an attempt to relate to and to verify the ratings students have made.

Survey Questionnaire

A survey questionnaire was devised to assess the qualities of the outdoor spaces throughout the campus. The survey included attitudinal scales as well as selection from options. The questionnaire involves issues that pertain to the overall design quality; best outdoor spaces as perceived by the students; best design features available in those spaces; signs and signage systems; lights and lighting systems; seating arrangements; shading devices
and safety. As part of the assignments of the class of Engineering Skills and Ethics of Spring 2007, students were required to distribute and collect the questionnaires among their colleagues of the college of engineering and of other colleges. Therefore, a considerable number of responses were received from students. However, another round of questionnaire distribution was undertaken early in the Fall semester of 2007. The total number of valid responses to the questionnaire received was from 123 students.

Behavioral Mapping
Behavioral mapping is a systematic way of recording peoples' locations, such as where they sit, stand, or where they spend their time. In this research a combined unobtrusive mapping technique is used which integrates "place-centered" mapping and "individual-centered" mapping. Place centered mapping aims at observing actions in a particular setting which are recorded on plans or diagrams. Individual centered mapping aims at recording the tasks, activities, and movements of people throughout the space. It represents a systematic learning about a particular group of individuals whose activities are distributed throughout a specific period of time.

Four key outdoor spaces within Qatar

<table>
<thead>
<tr>
<th>Days of Observations</th>
<th>Space 1</th>
<th>Space 2</th>
<th>Space 3</th>
<th>Space 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>09.15 - 09.40</td>
<td>10.45 - 11.10</td>
<td>08.45 - 09.10</td>
<td>10.50 - 11.15</td>
</tr>
<tr>
<td></td>
<td>01.00 - 01.25</td>
<td>12.45 - 01.10</td>
<td>12.45 - 01.10</td>
<td>08.45 - 09.10</td>
</tr>
<tr>
<td>Monday</td>
<td>09.15 - 09.40</td>
<td>10.45 - 11.10</td>
<td>08.45 - 09.10</td>
<td>10.50 - 11.15</td>
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<tr>
<td>Tuesday</td>
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<td>Wednesday</td>
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</table>

Table 1. Days and Timings of Observation Periods for Each Selected Space, Considering the Beginning and Ending of Classes and the Break Time In-Between
University campus were selected purposively as shown in (Figure 6). Spaces 1 and 2 are associated with the Dean of Engineering and the Associate Deans’ offices together with their secretaries. The assumption is that there will be an intensity of movement and use in these spaces where faculty, students, and staff communicate regularly with these offices. Space 3 was selected based on its location in close proximity to the faculty parking and at the same time leading to Engineering admin offices. Space 4 was selected as a representative space along the central pedestrian spine within the academic buildings.

Since the purpose is to investigate the usability of the outdoor spaces, each of the four spaces was observed 6 times with an overlapping period including the beginning and ending of classes and the break time in-between (Table 1). It is noted that the observation of each space is carried out over a period of two days within the week as breaks between classes differ.
KEY FINDINGS AND DISCUSSION

Walkthrough Evaluation Results
The results of conducting the walkthrough evaluation reveal some alarming scores. Issues underlying contextual and massing category are generally in the middle zone where the total average score is (3.125) on a five point scale (Table 2). In the majority of the issues, similar scores are found. However, it is noted that two related aspects appear to be seen by the majority of students as inappropriate. The first issue relates to the physical appearance in relation to ease of functional identification for a typical user (2.25), and the second issue relates to meaning and finding destination for a visitor (1.75).

Issues underlying interface and visual appearance appear to be a little less than average in terms of appropriateness (2.96). However, there was no similar distribution among those issues (Table 3). This is evident in the scores given by the students to different issues: the effectiveness of the exterior in reflecting the interior functions; the appropriateness and functionality of the connection between the inside and outside; the accessibility of entrances/exits; and the moving experience were scored (2.75); (2.25); (2.75); and (2.50) respectively. While all these underlying issues are within average in terms of appropriateness, other issues were scored as more appropriate including the relationship of the openings to the interior space functions; the clarity of public-private relationship; and the overall fit with the surrounding buildings; these were scored (4.00); (3.50); (3.00) respectively.

Wayfinding aspects appear to be inappropriate where the overall average score is (2.062). The only underlying issue that appears to be appropriate as seen by the respondents is sufficiency of routes and pathways provided to and around the buildings (4.00). All other issues seem to be unsatisfied and were scored (2.50) and less (Table 4). These include effectiveness of routes, traffic patterns around the buildings; outdoor meeting points; convenience and comprehend-ability; visitors' orientation; markings and signs; and the overall signage system.

Survey Questionnaire Results
The 123 responses received from students are analyzed by question in an attempt to articulate how different qualities are perceived by the respondents based on frequencies of responses to options, selections, or scale value. Similar to the walking tour, the emphasis here was only on the old campus.

Respondents rated the overall quality of outdoor spaces as fair (25%), good (27.5%), and bad (40%). Only 7.5% of the respondents rated the overall quality as excellent. It is noted that the majority (89%) of those who rated the overall quality as bad gave one or more of the following reasons:

- "The designer did not do a good job in designing the shading system because they are not enough"
- "The system of routes and pathways is designed without any concern for the students comfort"
- "Not enough green or trees."

Students stated their interest in the best outdoor space in terms of green space, enough shading devices, nice seating, and good meeting spots. An outdoor space that has more green and trees was selected by 34% of the students as the best space, while the one which has enough shading was selected by 28% of the students. On the other hand, a space which has nice seating arrangements was selected by 25%, while only 6% selected a space which is a good meeting spot. It should be noted that 7% of the students have not responded. Answering this question, few students reported that the best outdoor space as a good meeting spot is not important anymore as they are used to go to the recreational center to meet irrespective of the walking distance they make.

The three design features offered for selection by the students were Main Pedestrian Spines and Walkways, Outdoor Space Seating, and Presence of Green Spaces, Trees, and Flower Beds. 40% selected main spines and walkways as the best design feature, 22.5% selected outdoor space seating, and 12% selected the presence of green spaces, trees and flower beds. Notably, 25.5% of the students have not responded to this question. While this result may seem to be contradicting with the scores of the way-finding aspects, it should be seen within the context of the choices given to the students.

Asking the students on how easy or how difficult they find their way around the campus and in between the educational buildings, 70% of the respondents stated that it is difficult, while 18% stated easy and 10% stated it is very easy. While this result supports the general assumption of this work, at the same time they correspond to the scores...
given under different categories of the walkthrough evaluation. The majority of those who stated the there is difficulty to find or discern routes and reach destination in a timely manner wrote one or more of these reasons: "bad signage system", "corridors and buildings all look alike", or "difficult to distinguish between different colleges."

40% of the students rated the quality of signage and sign design as bad, while 32% stated fair, 21% stated good, and 4% stated excellent. Only 3% of the students have not responded to the question. The majority of those who rated the signage and sign design as bad stated one or more of the following reasons:

- "Signs are very old, broken and need maintenance"
- Some signs are just not clear at all
- Signs are only available in the main walkways
- Signs are not obvious, difficult to read from a distance"

Responding students appear to be satisfied with the lights and lighting system in the outdoor spaces. 92% of the students rated lights and lighting system design, as excellent (20%), and good (52%), and fair (20%). However, 6.5% do not feel that the system is good enough. In their responses, those who feel the lights are excellent, good or fair stated one or more of these reasons: "enough lights are available anywhere you go in the campus, the light system is a nice and organized."

50% of the respondents believe that the seating arrangement is bad, 32% believe it is fair, 11% believe it is good, while 2.5% believe it is excellent. 4.5% of the students have not responded to the question. Those who are not satisfied with seating and its arrangements throughout the outdoor spaces stated one or more of the following reasons: "seats are really uncomfortable cause back pain, seats are never clean-impossible to set on them without getting some dirt on your clothing, while seats look nice in the outdoor spaces they are not shaded enough."

A striking observation is that the result of rating the shading systems in the outdoor spaces corresponds with the result of rating the signage and sign design. 40% of the students rated the quality of seating within the campus outdoor spaces as bad, while 32% stated fair, 21% stated good, 4% stated excellent, and 3% of the students have not responded to this question. Those who do not seem to be satisfied with the shading system reported one or more of these reasons: "the design of shading devices does not allow for enough protection from sunrays, shades are not enough in the majority of the spaces, most of the outdoor walkways are not shaded at all, and by the time we reach the places we want, we become tired due to continuous exposure to the sunrays."

There appears to be a general satisfaction with the overall safety throughout the outdoor spaces where 70% value the safety aspect as excellent (12.5%), good (35.5%), and fair (32%). While 12% rated safety as bad, 18% of the students have not responded to the questions. The majority of those who stated fair or bad reported one or more of the following reasons: "we have not seen any fire alarm systems or fire equipment in the covered walkways, we never see a security staff walking around the campus and in between the outdoor spaces, the continuous exposure to the sun due to lack of shading may impact our health; the tiling of walking ways is rough and does not make us feel comfortable while walking." On the other hand, a few of those who are satisfied with the safety aspect mentioned: "the campus offers a homey close community style."

Behavioral Mapping of Four Key Outdoor Spaces

A series of maps were drawn for each of the four key outdoor spaces. Observation of the four spaces took place according to the times shown in (Table 1), and then combined behavioral maps are drawn to reflect the total use of each space by different user types (Figure 7).

The most striking observation is that none of the four spaces is used as intended. No gathering or social interaction among students or among faculty and employees, or between students and faculty take place. Seats in the four spaces are not used at all by any user type during the observation times. This is due to insufficiency of shades or the presence of dust and dirt over the seats. All the four spaces are typically used as circulation spaces either in transitional movement between different sections within the educational buildings, or in direct movement across the educational buildings or colleges.

While spaces 1 and 2 differ in terms of their physical features including trees and seating arrangements, it is noticed that they have similar types of users. In space 1, the number of faculty 9, students 32, employees 21, while in space 2 the number of faculty 8, students 30, and employees 17. However, the number of laborers varies as it is
31 in space and 12 in space 2. These total numbers of laborers appear odd when compared to faculty, students of employees. The only difference between space 1 and 2 is that a total number of five students are observed using their mobile phones in the space standing in the space but in close proximity to its access.

While space 3 was selected because of its close proximity to the faculty parking and its location along one of the major spines leading to the Dean of Engineering and other College admin offices, it was expected to observe higher number of faculty and employees. However, it is noticed that the combined number of employees in space 3 is 2 while that of faculty is 6. On the other hand, the total number of students combined over six break periods in different days is 55, while 13 for laborers.

The combined behavioral maps of space 4 which was selected as a representative space along the main central pedestrian spine show a different pattern of user types. The number of faculty is 12, which is double that of space 3, the number of students is reduced to 44, while employees’ number is 1, and that of laborers is 9. Notably the presence of laborers in the four spaces needs special attention.

CONCLUSION

This paper presented an assessment study of the performance of Qatar University campus public spaces from the users’ perspective. The assessment aimed at understanding the mutual interaction process between the built environment exemplified by campus outdoor spaces and the needs of the university community exemplified by students, faculty, and staff. An argument on the value of evaluating outdoor spaces from the users’ perspective is
developed in order to contextualize the research activity presented. On this basis, defining problematic areas related to the utilization of current public spaces was envisioned in order to develop a framework for possible future improvements. The methodology adopted to achieve the project objectives was multi-layered and involved a wide variety of assessment techniques, including walkthrough evaluation, observation, behavioral mapping, and questionnaires. The investigation revealed a number of problems that may hinder the performance of different types of QU campus users.

It is noted that the walkthrough evaluation and the scoring of several underlying issues reveals inappropriateness in two sets of aspects: interface and visual appearance, and way-finding. As seen by a sample of 58 students, finding solutions to this inappropriateness is important. As well, the fact that many respondents to the questionnaire have expressed their concerns for way-finding issues, seating and shading in the majority of the outdoor spaces, and the overall experience in those spaces reflect the need for certain actions to be taken. On the other hand, the behavioral mapping observation study illustrates lack of efficiency of the four key spaces examined. Such spaces are used in cross and direct circulation by all user types but are not used as intended for gathering and social interaction. This was due to one or more reasons that are simply reflected in the results of the walkthrough evaluation and the survey questionnaire.

The overall analysis of the results shows a dramatic difference between the statements made by the architect and users’ expectations. In essence, a huge gap between design intentions and the parameters examined does exist. Therefore, I argue that by assessing the success and failure of current outdoor spaces of Qatar University campus. Thus, the paper offered valuable insights into fostering the educational experience for the campus users. It is anticipated and hoped that the findings will be in direct use by the University administration and are utilized toward conceiving scenarios of actions that ultimately benefit the educational process while at the same time increasing the sense of belonging to the university’s physical environment from the users’ side.

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INTRODUCTION

Learning the grounds of sustainable design practices in architecture is a prime goal for everyone involved in architecture education in these days. Architects, like everyone else, have finally understood that sustainability is not just a trendy obsession and neither is naturally implicit in their practice tradition. Especially, the new generations of architecture students are showing an increasing interest in this global issue (See Figure 1, Studio-based learning culture today). According to Beneitone (Beneitone et al, 2007:82-102), Latin American architecture students stress the importance of being able to undertake architectural and urban development projects by guaranteeing sustainable development. The ubiquitous competence-based learning model requests specific abilities to perform the sustainable development of design, construction, operation and decommissioning processes concerning our current and future built environment. Agreeing with Salama (Salama, 2006:64-83), the best way to learn about what really happens into the life-cycle of buildings and natural phenomena or systems is to expose the undergraduate architecture students to primary source materials and pertinent real-life situations. In the Department of Architecture at the Universidad Técnica Federico Santa María (UTFSM), studio instructors are testing realistic experiential-learning scenarios to support the demonstration-practice-production-critique cyclic process (Eickmann, 2004:241-247) in order to avoid ready-made interpretations and the instructor's own beliefs (Salama, 2006:64-83).

Furthermore, a special-purpose team focused on the innovation of the current UTFSM pedagogic model is searching outdoors for more effective learning environments. On the other hand, diverse civil engineering departments at UTFSM are currently looking for innovative learning experiences to teach their respective study programs by enhancing laboratory infrastructure or implementing over-technified classrooms. As a matter of fact, Mitchell (Mitchell, 2003) makes us aware to avoid fixing the learning space in to the required infrastructure that supposedly improves learning. Outdoor workspaces provide new opportunities to integrate different learning styles (Kolb & Kolb, 2005:193-212) and infrastructure to improve learning, as long as specific environmental requirements are considered.
The next section describes three methodologically different experiences in architectural design education carried out by different instructor teams of the Department of Architecture at UTFSM over the last nine years. All three experiences involve strict nature reserve areas. The first introduces the Antarctic as a unique learning environment for the development of extreme zones architecture. The next two exemplary cases show the use of experiential learning tactics in sustainable design practices within a controlled natural environment at the southern Pacific coast of South America. Towards the future creation of an environmentally-friendly outdoor studio classroom, the use of this latter location amalgamates the idea of the "Constructionarium" (Ahearn et al., 2005:6-16) with Pollak's idea (Pollak, 2007:39-54) of using the building site as a communication vehicle between clients, students and experts. In all cases, students are first encouraged to perform the same or most similar activities for which they are asked to give space in natural environments on site and then, whenever it is possible, to experience their own design solutions in flesh and blood. With these few examples we will try to sketch out some key opportunities and challenges in outdoor architectural design education and research.

THE ANTARCTIC STUDIO

The first case is concerned with the nonpareil challenge of commissioning fifth-semester students of architecture to design a permanent polar station to shelter twenty-four Chilean Air Force operators and scientists involved in navigational and logistical support for air transportation between Punta Arenas and the South Pole. During the second academic semester of 1999, twenty participants of the Antarctic Studio 3.99 at UTFSM developed the main logical and physical components of the Estación Polar Teniente Arturo Parodi (EPTAP). The studio instructors Pedro Serrano, Marcelo Bernal and Paul Taylor installed the EPTAP station helped by a twenty-man team of the Chilean Air Force (Serrano et al., 2003:73-78).

Five studio teams applied a component-based product design methodology to devise a 260sqm polar station that fits into a military aircraft Lockheed C-130 Hercules and can be assembled by hand on the Antarctica in few days time. The adopted methodology by Taylor, Bernal and...
Serrano (Taylor et al., 2000:62-65) enabled the studio participants to focus on satisfying the extreme sophisticated technical constraints of the commission (See Figure 2 the Antarctic Studio methodology).

Design workspace extended beyond the university campus to the coastal dune field of Concón and the Antarctica (See Figure 3 Dune test and EPTAP station assembly on the Antarctica). Studio participants combined alternately the CAD lab with the fluid mechanics lab and materials technology lab at UTFSM, parallel to a series of field tests exploiting firn-similar coverage of quaternary sand hills close to Valparaíso. The available design technology comprised Alias/Wavefront’s CAID software StudioTools® running on 8 Silicon Graphics O2 workstations. Additionally, the studio participants conducted wind tunnel tests on small-scale prototypes and material tests on real-scale samples. The design-build process (Hinson, 2007:23-26) involved the students in trying alternative technologies and new-generation materials.

The construction methodology applied over the whole studio period consisted of a recursive assembly-disassembly cycle. The assembly-disassembly process had to be easy and quick. Further construction methods applied on site are described by Taylor (Taylor, 2006:49-51). Thus, construction workspace embraced the UTFSM campus patios, textile fabrication and steelmaking facilities, Cerrillos Military Airport (See Figure 4 Loading the C130-Hercules Airplanes with the EPTAP station components) and finally the lap of the Patriot Hills on the Ellsworth Land (Lat. 80°19’ South, Long. 81°18’ West). On top of a 120cm thick base of firm with compressed ice below, 24 hours sunlight, 100km/h catabatic winds, and temperatures between -30°C and -10°C. Each student team respectively experienced the product line of steel, plastic and textile components including fasteners, connectors, interface-protection components, main parts, and labels. In this process, they actively learned the basics of product tooling, documentation and building times of standard assembly technology currently available in our country. Once on site, except for one Sno-Cat to dig a trench in the firm where the EPTAP station found protection against the turbulent catabatic winds, construction technology exclusively comprised shovels and human force. Students’ predictions and calculations...
proved correct.

The EPTAP station operates exclusively during the six months of daylight for 10 years now. The operation methodology of the Madrid Protocol describes the allowable use of energy, water, provisions, sanitary system, sleeping capsules, storage, and garbage disposal. Students were encouraged to develop innovative design strategies to achieve zero energy consumption and portable human waste systems. A bright membrane tunnel retains stable temperatures between -5°C and -1°C supporting varied scientific activities and practical work. Six fiberglass polar capsules offer enough space for sleeping and socializing accommodation. Electric energy is obtained from a mixed system, which combines JP-1 generators, antifreeze, eolic generators, active and passive solar generators. Ventilation technology exploits the Venturi effect on the turbulent catabatic winds. There is also a CO and CO_2 sensor inside each sleeping capsule (Serrano, 2002) in order to activate additional forced ventilation devices.

The students devised a decommissioning methodology that enables unskilled users to dismantle the whole station by hand. The main dismantling operations can be carried out indoors. As certified by the Chilean Government (Republic of Chile, 2000:1-4), all materials used in the fabrication of the EPTAP components are locally recyclable, and operation as well as decommissioning methodology and technology guarantees zero environmental impact over the Antarctica (See Figure 5 The EPTAP station fully operational).

THE HANGING STUDIO

The second case corresponds to a short-term outdoor studio experience carried out with first-semester students led by the studio instructors Raúl Solís and Francisco Valdés - with the periodic involvement of instructor Pedro Serrano - within a middle-aged pine forest located inside a strict nature reserve cliff area at the Chilean Pacific coast. Students organized themselves into five-member communities to design and build sustainable sleeping capsules for their own community. No shelter was allowed to touch the ground and no tree to be damaged. The students produced a small removable village hanging down from the trees in many different ways by achieving zero environmental impact by using small scale design opportunities (Hughes, 2006:54-57). The learning experience
concluded after all students spent a cold winter night of 2007 in their own produced shelters, presented their impressions and proposed further improvements on their design solutions (See Figure 6 The Hanging Studio methodology).

The design methodology consisted of prototype development methods. Students started a design-build process by visiting the site, located inside the Quebrada Verde Ecological Park of Valparaíso (www.parquequebradaverde.cl: October 2008). During the first visit, students conducted a tree inventory by giving special attention to the details of position and structural conditions of the community forest. The prototype development method allowed them to generate and test different tying strategies and wooden structures in less than two weeks. Again, student's design strategy was subject to portability and assembly components. The same strategy was used in 2005 by Hormazábal and Serrano (Hormazábal & Serrano, 2007) in another outdoor studio concerning the development of a geodesic dome with sixth-semester students. The indoor design workspace instead, provided secure storage for materials and power supply for the electric drill. Design-build technology comprised standard carpentry tools and various knot techniques. Actually, very few drawings were made and if, only by using pen and paper. The brief experience with knots enabled the students to actively learn more about the concept of mechanical advantage.

Again, the applied construction methodology consisted in a recursive assembly-disassembly cycle by which each student team produced its own real scale prototypes of detachable components of the sleeping capsules. Construction methods to produce the sleeping capsules ranged from mortise-and-tenon joints to uncomplicated screwed joints. Hanging methods instead, exclusively considered knots. Construction workspace was previously defined by each studio team at previous visits to the outdoor design workspace. So most commu-
nities’ capsules had to relocate and readapt their hanging strategies to the new environment before nightfall (See Figure 7 Relocating the sleeping capsules hanging down from the trees). Construction procedures were subject to the zero environmental impact philosophy. Consequently, some dry toilets with garbage bags inside were temporarily installed on site. Students applied unplugged carpentry technology to simple materials including a small repertoire of wooden posts and boards, tent cloth, ropes and safety straps. The iterative assembly-disassembly experience required by the prototype development methodology itself, taught the novice students an important lesson about design flexibility and the concretion of design intentions in architectural work.

The operation methodology for the hanging capsules was conceived to last just one night by taking examples of emergency shelters in natural protected environments. The operation goals aimed to achieve inside each capsule a minimum space capacity for 5 adults, load capacity over 500kg and minimum bioclimatic comfort. The studio participants had to endure their own design solutions for 24 hours and learn a durable lesson on professional commitment and responsibility at a very early stage of their careers. The operation workspace temperatures during that day reached 20°C while at night they hardly draw near 5°C with winds flowing between 2km/h and 4km/h. Operation technology was reduced to battery lanterns, brooms, rakes and garbage bags.

One week after the overnight experience, students took the capsules down from the trees and proceeded to disassemble them. Every component was returned to the UTFSM campus and stored for future experiences. The trees and the site ground were checked again to see if any damage of lost objects were found. The workspace for the capsules’ decommissioning was delimited by the design instructors from the very beginning in order to get more control over both construction and dismantling activities. Decommissioning technology was the same as that employed to reconstruct the capsules on site, all by hand (See Figure 8 Example of two hanging communities fully operational).

THE TREKKING STUDIO

The third case applies to a computer aided architectural design studio led by studio instructor Luis Felipe González - with the periodic involvement of instructor Pedro Serrano - carried out at the end of 2007 involving from seventh-semester students to tenth-semester students. The design task arose from the research work of Serrano and Ruivo (Serrano & Ruivo, 2007:697-702) by focusing on the development of sustainable infrastructure systems to support trekking activities on remote-located zones. The studio experience provided us with useful material for an ongoing research project focused on the development of sustainable park infrastructure systems.

This particular case differs drastically from the previous studio experiences. According to the introduction of computational methods and a scientific modeling approach in traditional studio pedagogy (See Figure 9 The Trekking Studio methodology), the trekking studio participants were encouraged to work with a constraint-based design methodology based on research work of Donath and González (Donath & González, 2008:97-117). Students were asked to specify semantic,
topological and geometrical relationships between elementary components of the trekking support system. Computer logic and structured thinking were alternated with outdoor trekking activities which the students were encouraged to perform in order to acquire real data for requirement analysis. The studio workspace brought the CAD lab and the ephemeral trekking footpath system crossing the Quebrada Verde Ecological Park of Valparaíso together.

The students developed a distributed network of standalone supply stations for the park, which delivered us some first cues towards the creation of a permanent outdoor studio classroom with zero environmental impact in this area. Traditionally-taught architecture students achieved to model discrete sets of elementary design constraints over their specific design problems by using Maxon’s Cinema4D XPresso ® visual scripting language. The tool was used to concurrently elaborate formal and graphic representations of the constrained search space for architectural design problem stated in the studio workspace. The resulting digraphs allowed the students to visualize and comprehend the complexity of design problem structures from a truly new perspective in their case.

Construction methodology was based on Habraken’s support design method (Habraken et al., 1981). The basic idea was to develop support structures by using local natural materials while detachable compartments were made up of light synthetic materials by making them portable and replaceable. The introduction of a rather dry scientific approach and the incorporation of complex computational methods to their instrumentarium, the actual construction of the prototypes was carried out later on within the framework of an academic research project. The same assembly-disassembly cycle performed in the past, the construction workspace ranges over different places including the UTFSM campus and the Quebrada Verde Ecological Park territory. All construction space strategies developed by the studio participants assumed that most sites were inaccessible to motor vehicles. Support structures were designed to be built on site and left there permanently, while the detachable infill components had to be carried and connected to the support structure by any manual mechanism. The small size of each component allowed the digital fabrication of prototypes inside the Materials Lab (http://labomat.wordpress.com: October 2008) of the Department of Architecture at UTFSM.

Each trekking support station was conceived as a small standalone service system to provide first aid, dry sanitary service, solar cells power to recharge a cellular phone or GPS receiver, and minimum storage capacity for drinking water and...
imperishable food. In some cases, temporary accommodation was considered. Two different real scale prototypes are currently fully operational inside the Quebrada Verde Ecological Park of Valparaíso. Studio participants were encouraged to familiarize themselves with the trekking culture by scanning the existing trekking routes of the park (See fig.10 Students familiarize themselves with the trekking culture). The operation space for the trekking support stations was concerned with remote-located zones, inside existing trekking route systems. The trekking studio participants agreed to take the whole 500ha natural territory of the Quebrada Verde Ecological Park of Valparaíso under consideration. The spectacular cliffs over the South Pacific Sea attracted special interest, mainly because of its dangerousness. The standard operation technology which included dry toilets, photovoltaic panels and rain water collectors, usually requires low maintenance over long periods of time.

The students designed a decommissioning methodology for the permanent part of the trekking stations, focused on the life cycle of biodegradable materials and the physical, functional, locational and environmental constraints of the ageing process of architectural structures. Some innovative design solutions (made by older students) concerning mobile support structures discussed vehemently the need of decommissioning workplaces in this case. In other cases, technology required to dismantle a trekking station was conceived to be done by hand with less effort (See Figure11 Example of one trekking support station designed by a student).

CONCLUSION AND FURTHER WORK

Local research findings by measuring the student workload required to achieve the objectives of architecture and computer science study programs at UTFSM, proved clear supremacy of the amount of time spent by students on two activities in particular: (i) personal study and (ii) performing specific assignments. The figures revealed that at least twice the total amount of time spent by students in learning activities occurs without the presence of the teacher and in any place. It is possible to deduce that learning occurs inside and outside the classroom or the university campus.

The combination of both facts: (a) a multi-tasking ability and (b) the ability to learn at any time and everywhere; may justify the combination (cross-programming) of architectural space functions. Some successful examples to facilitate learning arise when combining study room and cafe, debate room and atrium, information room and corridor, test lab and swimming pool, design studio and Quebrada Verde Ecological Park, and so on. The preliminary conclusion about the three studio experiences exposed before, suggest creating continuity between the activities inside and outside the classroom. In this sense, it is important to create the space required to accommodate both teaching practices and students' daily activities so as to coexist synchronously with similar efficiency.

Students knew that these were real cases where their design proposals would actually be built, even that one case where environmental conditions were dangerous for human life such as the EPTAP station in Antarctica. In other words, students became aware of the real habitability of their own architecture projects, especially in extreme zones. This awareness led the research process towards solution alternatives, organization and strategies, which sequence and coordination contribute to the formfinding process and the specification of materials and systems. The exercise of testing the habitability of their own projects on themselves provided the students with the fundamental knowledge of how people can be affected by their design and planning decisions (Salama, 2008:100-128).
Further work: The Floating Studio

Among other possible examples on outdoor learning, the current architectural design studio is working on a new challenge: To design, build, test and evaluate six floating units to be placed in the middle of a pond inside the Quebrada Verde Ecological Park of Valparaíso. Our future goal, depending on the next studio outcomes, will be the development of an aquatic floating classroom for our university.

The current design task involves two student teams: The first team integrated by first-semester architecture students are commissioned with the design and construction of floating structure. The second team comprises eighth-semester students who are in charge of implementing a classroom upon one of these floating structures. The first-semester team are asked to develop different strategies for the design, construction, operation and decommissioning of the floating structures. The current studio envisions a dramatic scenario in which the South Pacific Sea inundates part of the Chilean coast caused by future global warming effect. The first design task was presented as a contest to devise their own life jacket and test it in the swimming pool of our university campus. The second challenge was to develop wood joints and assembly modes for 3x3m wooden platform with load capacity up to 800kg. Students learnt the Archimedes principle of buoyancy by sawing and screwing. After two weeks of trial and error, the studio participants organized themselves into 8 production units to complete the mass production of the six floating platforms and the respective number of life jackets. Again, respect for the environment and experiential learning is enabling the students an intense learning about constructive structures, materials, shapes, organization and functionality (See Figure 12 Preliminary experiences with the Floating Studio Classroom).

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The Future Setting of the Design Studio

Burcu Senyapili & Ahmet Fatih Karakaya

Abstract

This study explores the impact of virtual classrooms as an emerging classroom typology in comparison to the physical classrooms in the design process. Two case studies were held in order to infer design students’ classroom preferences in the project lifecycle. The findings put forth figures that compare two forms of design communication in the two classroom types in terms of their contribution to design development. Although the students acknowledged many advantages of web-based communication in the virtual classroom, they indicated that they are unwilling to let go of face-to-face encounters with the instructors and fellow students in the physical classroom. It is asserted that the future design studio will be an integrated learning environment where both physical and virtual encounters will be presented to the student. Utilizing the positive aspects of both communication techniques, a hybrid setting for the design studio is introduced, comprising the physical classroom as well as the virtual one. The proposed use for the hybrid setting is grouped under 3 phases according to the stage of the design process: as the initial, development and final phases. Within this framework, it is inferred that the design studio of the future will be an integrated form of space, where the physical meets the virtual.

Keywords: Classroom, Design Studio, Hybrid Course, Learning Environment.

INTRODUCTION

Design education is generally carried out in design studios, where design students communicate on their projects with their instructors and fellow students. In the design studio students express themselves, introduce and discuss ideas, generate and evaluate alternatives, and make decisions based on given projects. In the traditional design studio setting, student-instructor communication is held face-to-face, through physical encounters. The possibility of face-to-face interaction is a key advantage of the place-based offering. It is through this interaction that the students improve skills as presentation and debate (Parker and Rossner-Merrill, 1998). Hundhausen et.al. indicate that the key features of the studio-based education are construction and presentation of representations (Narayanan and Crosby, 2008).

With recent developments in technology however, Internet-based platforms emerged as an alternative to the face-to-face design communication and to the physical encounters in the classroom. Web-based communication seems to eliminate the prerequisites related to the physical classroom setting, such as having to be in the classroom at a specific time, by enabling the virtual classroom alternative (Norman, 2001; Reffat, 2002; Kalay, 2004; Clark & Maher, 2005). The virtual classroom also allows for having feedback in written form for further and repeated reference. Students no longer have to come to the design studio with drawings and scaled models, and wait for the specific time interval to meet with the design instructor to get face-to-face oral critiques. They can now load their drawings or 3d files on a website or attach them to e-mails, and get written critiques on their designs within a pre-determined time interval.

As the virtual opportunities emerged, soon it became inevitable to discuss the future of design education and the implications of the virtual opportunities on the design pedagogy (Clayton, 2000; Andia, 2002; Oxman, 2007; Akkoyunlu & Soylu, 2008). Based on the advantages of the virtual classrooms and given the strong background of this generation of students in using and being familiar with computers, with a rushed presumption one might assert that majority of the design students would prefer to use web-based design communication. Extending the presumption, it may be expected that as the students use Internet-based communication, they will attend to the design stu-
dio less, deserting the physical classroom.

Within this framework, two consecutive studies with two different student groups were held involving both physical and virtual classroom settings. The aim was to infer design students' classroom preferences in the project lifecycle. In order to determine their preferences a special focus was cast upon the communication techniques used in both classroom settings. In the physical design studio communication is held face-to-face, whereas in the virtual one the communication is held through web-based techniques.

Current generation of design students comprises members of an age group who were introduced with computers at an early age. Even though they may not have started using computers at early ages, they regard and accept computers as part of daily life. It is worth investigating whether this situation leads them to favor computers for design communication. Moreover, it is intriguing whether students become more self-focused using computers for design communication rather than getting socialized in the design studio.

HYBRID LEARNING ENVIRONMENTS

In higher education, in fields other than design, with the incorporation of new educational techniques, hybrid courses have been developed (Latchman, 1998; Dennis et al., 2002; Koohang & Durante, 2003; El-Gayar & Dennis, 2005; Sigle et al., 2005; Nguyen & Bodi, 2007).

Hybrid courses are courses in which a significant portion of the learning activities takes place online. Hybrid courses reduce, but do not totally eliminate, the time spent in the classroom. According to Garnham and Kaleta (2002), the goal of hybrid courses is to join the best features of in-class teaching with the best features of online learning to promote active independent learning and reduce class seat time. Accessibility to the course content, effectiveness of large lecture instruction, and level of connectivity between students and instructor are advantages of hybrid courses over the traditional face-to-face physical classroom encounters (Poltrock & Engelbeck, 1999; Cheng & Kvan, 2000; Johnson, 2002). In the fields where hybrid courses are practiced, studies demonstrate that few students have difficulty using the technology; and the instructor spends more time on individual communication compared to a regular class (Hensley, 2005).

In an earlier study, Benbunan-Fich and Hiltz (2003) found that there were no significant differences in the perceived learning by students between three modes of courses; traditional, mixed and totally online. They suggested that such studies need to be carried out in other fields than theirs. This study introduces a mixed (face-to-face and online) setting for the design studio to find out the students' assessments of the setting. The structure of the online activities is different in design considering that in many other fields the content travels one-way from the instructor to the student, whereas in the design studio, the content travels back and forth in revised versions (Levine & Wake, 2000). Therefore, the findings of the use of online activities in the design studio may differ from those in other fields. In this study the impacts of face-to-face communication through physical encounters and web-based communication through virtual encounters are examined. Al-Qawasmi (2006) discussed the transformations in design education after the emergence of the virtual and paperless design studios under several titles including ‘peer learning’, inferring that the basic assumptions are changed in the traditional design studio. This study is an attempt to explore the direction which these changes are pointing to.

CASE STUDIES

The case studies focus on the preferences of the design students about physical and virtual encounters. We worked with the 3rd and 4th year students of the interior architecture curriculum at Bilkent University Faculty of Art, Design and Architecture, to see their tendencies in preferring the physical and the virtual classroom.

The students enrolled in an elective design course in two different semesters have participated in the studies. The students were asked to develop design projects through physical and virtual encounters. Physical encounters comprised the face-to-face meetings and discussions in a designated design studio. Virtual encounters involved web-based communications using specific communication platforms. At the end of each semester the students were asked to fill in questionnaire forms assessing their satisfaction and inquiring about the strong and weak aspects of both encounters.

First Study

13 students participated in the first study, who were
enrolled in an elective course. Students formed groups of 3-4 to work on a given project. Total duration of the project was 6 weeks. A 3-hour course was held each week. There was one pre-jury (comprising 3 design instructors) during the project period. Students had the chance to have physical class hours each week (except for the jury week) and for the rest of the week they had the opportunity to communicate virtually through a server space specially allocated for the course (Senyapili & Karakaya, 2005).

Second Study
In the second study, 16 design students were enrolled in the same elective design course. Design students constituted 4 groups, each group composing of 4 students. This time, the design project duration was 8 weeks, with one 3-hour course each week, except for one week dedicated to the pre-jury. During the semester the students were required to have physical encounters as well as virtual ones, which were held through a special platform 'Virtual Campus' developed by Bilkent University (Senyapili & Karakaya, 2006).

KEY FINDINGS
The findings are grouped in three main categories composing of:
- students' background in using computers,
- students' assessment of face-to-face and web-based communications separately,
- students' evaluation of the both communications comparatively.

Students' Background in Using Computers
In a previous study, Koohang and Durante (2003) found that experience with the Internet was a significant factor in learners' perception toward web-based learning. In this study, initially students' experience in computer use was determined. All students had previous computer experience. Second group of students were more experienced with computers. In the first study, the student with the least computer experience had 3 years of experience (mean = 7,46), whereas in the second study the least was 6 years (mean = 9,18). Students indicated that they use computer for mostly writing, drawing, and connecting to the Internet. Especially regarding the Internet use, the mean of years of using the Internet for first group of students was 5,41, and 6,18 for the second group of students (Figure 1). Both student groups were familiar with computers, used to navigating in the Internet as well. Therefore, students were not expected to have difficulties in terms of handling virtual tools.

Assessment of Face-to-Face and Web-based Communication Separately
In the questionnaires, students were asked which type of communication they found useful the most. Major part of the students said that both techniques were useful, while a few favored face-to-face communication alone. Students were asked to evaluate both types of communications on a 1 to 5 scale, 5 being 'very helpful', and 1 corresponding to 'not helpful at all'. In both studies, face-to-face communication were favored more than web-based communication (for the first study the mean for face-to-face was 4,69 and and for web-based was 3,53) (for the second study the mean for face-to-face 4,62 and for web-based was 3,87) (Figure 2).

Both communication techniques were tested in terms of a given set of criteria, each item being evaluated on a 5-point scale, the criteria being:
- Understanding the critiques
- Preparation load for presentation
- Quality of presentation
- Changes on the design after the critique
Collaboration with the instructor
Collaboration with the friends

For face-to-face communication, the highest mean (M\text{first study} = 4.76, M\text{second study} = 4.37) was received in terms of understanding the critiques in both studies. This result indicates that understanding the critiques via face-to-face communication was evaluated as being easy by the students. For face-to-face communication, the least mean was equally received for both preparation load for presentation and quality of presentation (M\text{first study} = 3.76). In the second study, the least mean was received for quality of presentation (M = 3.28) and similar to the first study, preparation load for presentation received the second lowest mean (M = 3.76). These results showed that for face-to-face critiques students thought that the preparation load for presentations was dense and they were not satisfied with the quality of the presentations.

For web-based communication, in the first study the highest mean was received for understanding the critiques (M = 4.30), in the second study for collaboration with friends (M = 4.03). The least means for web-based communication was received for changes on the design after the critique in the first study (M = 3.30), and for presentation quality in the second study (M = 3.40) (Figure 3) (Table 1).

The most preferrable aspect of face-to-face communication in both studies turned out to be understanding the critiques. This shows that although the face-to-face critiques are not written and do not offer the chance of repeated reference, students still value the advantages of face-to-face communication, such as:
- facial expressions,
- instant response,
- complimentary figures of speech,
- gestures.

Interestingly, in the second study, web-based communication received the highest mean for understanding the critiques, with a slight difference in the mean. This provides grounds to argue that students acknowledge the positive assets of the web-based communication as well, which helped them in comprehending the critiques on their designs, such as:
- clear and concise critique text,
- chance of repeated references,
- chance of discussing with others over the critique text.

It seems to be no coincidence that both face-to-face and web-based communication have received least means for quality of presentation since students tended to blame presentation's inadequencies for the shortcomings of their design.

### Comparative Assessment of Face-to-Face and Web-based Communication

A set of 5 point scale was used to obtain an over-
all evaluation of both types of communication, in
terms of easiness, interaction, quickness, stimulation capacity, and clearness.

In the first study, face-to-face communication received highest mean for easiness (M= 4.46) and least (M= 3.84) for being stimulative. Web-based critiques, similarly, received highest mean for easiness (M= 4.53) and least (M= 3.69) for being stimulative. This result is very interesting as it shows that there is a comparatively students indicate no difference between the two techniques.

In the second study, the highest mean for face-to-face communication was received for clearness (M= 4.27) and the least for quickness (M= 3.57), whereas web-based communication received the highest mean for quickness (M= 4.50) and the least (M= 3,62) for interaction. Again, the findings rightfully acknowledge the time consuming nature of face-to-face communication, while giving credit to web-based communication in that aspect, but the differences are not major (Figure 4) (Table 2).

### DISCUSSIONS: A HYBRID SETTING FOR THE DESIGN STUDIO

The findings provide grounds to assert two major arguments:

1. The students have a strong background in computer use and they are familiar with way finding in virtual environments. With a quick presumption, one would expect them to favor web-based communication in a design environment. However, they hold on to the positive assets of traditional face-to-face communication and do not welcome web-based communication without reservations.

2. Although students seem to favor face-to-face communication while separately evaluating the communication techniques, when it comes to comparative evaluation, they do not seem to distinguish majorly between the two. In other words, they do not favor one communication alone. Figure 4 shows how close their evaluations for both communication techniques are. Therefore it may be asserted that in the design studio students will appreciate an integrated communication framework instead of utilizing one communication technique alone.

One interesting observation is that although students may get their critiques through virtual platforms whenever they want, without having to come to the design studio, they did not mention this as a positive factor. On the contrary, they indicated that they wanted to know how the others were doing and thus, some groups asked the others how their web-based critiques were. Fiedler (2001) states that invisibility of the instructors and a lack of contact with other students in e-mail communication often makes social interaction difficult, takes away the
personal connection to the class and the instructor, and this results in lack of knowledge about course participants and their projects. It is evident that keeping track of how the others are doing is important for the students and they feel that this is best achieved in the physical classroom. On the other hand, as the design project develops, in the virtual classroom setting, there are opportunities for the students to generate a collective understanding and communication rather than the instructor(s) alone (Hou & Kang, 2006). Therefore, the hybrid setting for the design studio, in terms of involving physical and virtual encounters, may change as the project evolves.

The project cycle may be divided into three phases: initial, development and final. The initial phase involves generation of ideas, the development phase involves collaboration with friends and the instructor(s), and the final phase focuses on the presentation (Figure 5). Based on the findings, it may be asserted that at the initial phase, the encounters should take place in the physical classroom. As the phases evolve, both physical and the virtual classrooms may be utilized. At the final phase virtual classroom may be used solely.

As the design process requires different means and densities of communication at different stages, the framework may be adapted according to the design phase. For the initial design phase the density of communication should involve face-to-face encounters (Figure 6), as the findings suggest understanding the critiques, changes in design and collaboration with the instructor(s) and collaboration with friends are better in physical encounters.

The continuous lines indicate primary communication; while the dashed lines represent secondary communication. The development phase involves both face-to-face and web-based communication (Figure 7). The presence of the student shifts from the physical classroom to the virtual one as the development phase emerges. Simoff and Maher indicate the need for a ‘warm-up’ period in the schedule of the virtual design studio for those students who have “difficulties in adapting to the reduction of personal physical interaction” (1997: 7). The mixed structuring in the development phase is expected to aid students organize their own pace in shifting to the virtual classroom.

In the final design phase (Figure 8), virtual classroom may be frequented more than the physical one, since the findings suggest that web-based encounters are found to be more satisfactory in quickness, clearness, required preparation load for presentation, and quality of presentation, assets that are more related to the presentation of the finished project.
CONCLUSION

This study is an effort towards determining the future setting of the design studio in the emerging power of the virtual classrooms. In order to determine the impact of face-to-face encounters in the physical classroom and web-based encounters in the virtual classroom, a study is held in a hybrid design studio setting. The group of students, who participated in the study, belongs to the current generation that is familiar with using computers. The findings showed that although the students acknowledge many advantages of using computers in design (such as economizing from time and decrease in physical stress in completing various tasks, high capacity and meticulous look of the outputs), they are cautious in their evaluation of the medium. Especially when design communication is involved, students still seem to value the factors inherit in physical encounters, such as facial expression, ability to respond immediately, and possibility of stating themselves verbally. Generating ideas may be faster and more productive while using computers, but students preferred the possibility of talking about the new alternatives quickly during face-to-face encounters and with the presence of classmates.

Considering the discussions that the future design studio will shift from the physical classroom to fully virtual ones, it may be asserted that there will be a transition period where hybrid courses - in hybrid environments - shall take place. Hybrid environments allow for integrated design communication, where face-to-face and virtual encounters are available to the students. Hybrid courses are employed in other fields, but their introduction to the field of design is new. In this study it is proposed that the hybrid setting for the design studio should involve the physical encounters more at the initial phase of design, evolving into a mixed setting of physical and virtual encounters in the design devel-
opment phase, and having more virtual encounters than the physical ones in the final phase. Such setting needs to be experienced and assessed in further studies in order to establish a beneficial framework for the setting of the design studios in the future.

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A "GLOBALIZED" STUDIO ENVIRONMENT: Configuring Reflexive Spatial Agendas

Michael Jenson

Abstract

De territorialization - a concept of territory where social, economic, and political space are not necessarily geographical has developed from the radical alterations brought about by rapid globalization. For the first time in history, cultural spaces are developing that have no tangible connection to geographical places. Conventional learning structures, teaching methods, and course content make it difficult for these educational institutions to operate effectively in this climate. To prosper, they must make decisions expeditiously and the development of new programs must take place quickly, seamlessly, and continuously.

More importantly, with the changes demanded by these processes, the classroom must truly become a global entity. In this paper, an argument is proposed that though the forces of globalization have radically changed our conception and use of space, its material manifestation is as important now more than ever to those training to be architects and designers. However, the old lecture hall and studio configuration must make way for a new type of reflexive space that allows disciplinary boundaries to become blurred and more flexible.

If this occurs, universities might again become bastions of critical thought illustrating possible types of alternative spaces and temporalities within our personal and communal lives. By cultivating spaces built on the imperatives of diversity and simultaneity, the monistic onslaught of the global network culture could be translated into a multitude of spaces and temporalities that add richness to the necessary social, political, and cultural aspects of our lives. Within architectural discourse, this call is doubly important because this type of individual will most affect the virtual/material interfaces that are becoming increasingly common as the effects of economic and technological transformations are felt on a global scale.

Keywords: Globalization, Education, Architecture, De Territorialization, Space.

INTRODUCTION: THE IMPORTANCE OF LOCALIZED EDUCATIONAL SPACE IN A GLOBAL WORLD

The processes of globalization are often described in several ways. These descriptions range from its being processes of liberalization, universalization, westernization, to the assertion that it is a form of internationalization. However, none of these completely capture the enormity of the transformation that has taken place over the last several decades than the term, de territorialization - a conception of the territorial where social, economic, and political space are not necessarily geographical. For the first time in history, cultural spaces are developing that have no tangible connection to geographical places. (Scholte, 2000:42)

Though globalization is nothing new, it is clear that the traditional territorial logic used to envision the world and our place within it is undergoing a radical alteration. This is forcing new methods of conceptualizing space/geography at every level. (Morgan, 2000:56) Mass immigration, technological advances, and the social transformation brought about by these has left a disjunction between traditional ideals embodied by an educational system connected to place and the reality that mobility and change are now the most pertinent currency of the new global economy. (Robertson, 2005:137) If our educational curriculum must
transform to meet the challenges of this new context, it seems our educational spaces (and how we envision them) must converge with these new demands as well. (Gruenewald, 2008:310; Burbules & Berk, 1999:50)

Conventional educational structures, teaching methods, and course content make it difficult for these institutions to operate effectively in this climate. To prosper, they must make decisions expeditiously and the development of new programs must take place quickly, seamlessly, and continuously. (Rahder & Milgrom, 2004:29) More importantly, with the changes demanded by these processes, the classroom must truly become a global entity. Disciplinary boundaries that have been in place for decades, if not centuries, must be reconceptualized from their being “walls”, to the notion that they are permeable screens that move and transform to adapt to rapid changes. (Smith, 2002:593) Since the delivery of knowledge is changing and becoming more global, the classrooms and community spaces housing them most adapt as well. (Freire, 1995:90) The traditional ‘bricks and mortar’ institutions that were the mainstay of education will have to transform into communication portals where students access information for courses anywhere and at anytime. (Taylor, 2001:234) Given this, nowhere is this need for the conceptualization of educational space more apparent than in those used to educate individuals in architecture, landscape architecture, and urbanism.

Traditionally, these educational spaces have been a curious problem, with the recent changes in the perception of space serving to heighten this peculiarity. The problem of creating an educational space for those potentially influencing the education of others is exceptionally challenging. Three types of structures have traditionally housed the education of architects and designers. The first is the “loft type”. This title describes a structure containing a large open space or spaces that are infinitely adaptable or transformable. Faculty and students utilize this type of space by making necessary interventions to adapt the space to changes necessary to better serve the learning experience. These adaptations reinforce the necessity of making or production in architecture. They are usually non-descript, quiet buildings. However, they are also frequently considered “ugly” and “out of place” within their respective campuses. Highly functional and utilitarian, they often baffle the members of their university communities that associate architecture with a formalized image of beauty and a distinct disciplinary tradition. (Langdon, 2007:xiii) Nonetheless, their functionality serves the architectural institution well by underscoring construction and the process aspect of architectural design.

The second type seeks to project an image of prestige and to portray architecture as a venerable discipline with a long history of contributing to society as a civilizing force. In a word, these buildings self-consciously attempt iconicity. They are generally older structures retrofitted for their current use. Though frequently successful in their purpose of educating the architect/designer with “an architecture of grandeur”, the retrofit of their spaces and mechanical systems is often less than desirable. They can house spaces that are cramped and inflexible with their mechanical systems functioning well below acceptable standards. Though they might truly be beautiful structures and quite civilized in appearance, studying within their walls is often a challenging and uncomfortable experience. (Langdon, 2007:xiii-xiv)

The third and final typology is rather recent and one to which this author is very familiar. With many schools and colleges using the community outreach concept, some programs are moving off the main campus to locations in the core of adja-
cent city centers. The idea is that an architect/urbanist should study within a context they will be affecting in their future careers. These spaces are usually commercial in nature and are prohibitive from any type of radical transformation.

They range from storefront configurations to open planned office layouts. That they are centrally located is a positive aspect. However, they are frequently leased spaces in non-descript office buildings. Forbidden from any type of radical change by...
legal/economic constraints, the creation of any meaningful identity connected to the predominate activities taking place within their spatial boundaries is severely limited.

As I often remind my students, the best thing about studying in this type of building is that one quickly realizes how important good architecture is to any endeavor. Studying, researching, and teaching in a space with such a lack of any architectural integrity reinforces my belief that education cannot completely fit within the corporate structure of global capitalism as frequently asserted. Education is not just a "business"; it has other ethical responsibilities beyond asset accumulation.

In this paper, I argue that though the forces of globalization have radically changed our conception and use of space, its material manifestation is as important now as it has ever been to those training to be architects and designers (Leopold, 1968:223). However, the old lecture hall and studio configuration must make way for a new type of reflexive space that allows disciplinary boundaries to become blurred and more flexible. Such configurations are not only desirable, but also necessary in both the training of students as well as the research of educators. That is, if properly equipping individuals to be successful in the navigation of the rapidly changing technological terrain of globalization is a central goal.

CULTIVATING A GLOBAL DESIGN CONSCIOUSNESS

In the text, The Moment of Complexity, Mark Taylor envisions an educational environment whose complexity is difficult to imagine by the standards in use today. Taylor dreams of institutions no longer devoted to the "cultivation of useless knowledge", but committed to discovering innovative ways of educating the next generation more effectively to prosper in the complex economic and social terrain of the network society. He asserts that the centuries old traditions and disciplinary "walls" of the university must change to allow educators the flexibility necessary in preparing students for the challenges of a career in a world changing at such a blinding pace.

This redefinition is necessary because our network culture is unleashing forces that are radically altering our social, political, economic, and cultural structures. (Gruenewald, 2008:308) The information revolution producing this shift from an industrial to a post-industrial economy is forcing our current institutions of higher education to the tipping point: either adapt or force the risk of becoming obsolete. (Taylor, 2001:268-269) The forces driving these changes are what Usher and Edwards describe as the "pedagogies of dislocation". (Edwards & Usher, 2001:12) They contribute to a space-time compression where the perception of distance is collapsing at a far greater speed than at any other previous time in history. Paradoxically, though this perceptual collapse creates a hyper awareness of the singular unity of the globe, the importance of the "local" is also exhibited. Discourses surrounding the definition of globalization frequently describe this awareness of the relative nature and significance of place within their arguments outlining the homogenizing nature of global forces. (Bowers, 2008:327) According to this view, a reflexive consciousness can emerge that clearly comprehends the interdependence of local ecologies, economies, and cultures within the homogenizing forces of globalization.

This heightened awareness realizes that globalization is not a singular process or simple phenomenon, but actually a series of processes relating to aspects of 'flow, relativity, association, (en)counter, movement, and networking'. (Edwards & Usher, 2001:23) To fully comprehend the potential ramifications of these fluid and complex forces, ones interpretive frame of reference needs constant reframing, realignment, and reinterpretation. (Morgan, 2000:57) To understand a consciousness that is reflexive - one that is open to being framed and reframed continually - the acceptance of globalization as set of seemingly conflicted forces is necessary. It is at once homogeneous and integrating, yet promotes greater connectivity as well as de territorialization at the same time. Though the world is becoming a "single place", encompassed within it are a multitude of diverse and fragmented contexts. (Edwards & Usher, 2001:24) Its processes provoke newly emergent experiences of both place and placelessness as well as feelings of (re/dis)orientation simultaneously. (Edwards & Usher, 2001:27)

The foundation for this kind of global consciousness is the cultivation of a set of practices that use mapping as a signifying and interpretive procedure. This method attempts to "make sense" of what is experienced in an imaginative way and leaves the modernist view of mapping as the representation of a finalized representation behind. (Greenwood, 2008:339) As an interpretive trans-
gression of imaginative and perceptual terrains, it attempts a transient coherence between our ideas, the worlds we encounter, and our subsequent actions. It provides the basis for envisioning the categories and structures allowing us to contextualize our surroundings. (Edwards & Usher, 2001:32)

Because this mapping process does not conceive its practices as involved with representation or formal closure, it allows the construction of meaning rather than its mere discovery. It is more involved with practices of (dis)location than location as a methodology of interpretation. (Stevenson, 2008:358) In addition, it is open to experimentation because its maps are susceptible to change as this imaginative process encounters other contexts of information. Its "maps" then are inherently exposed to reworking as new perceptual material induces them to be conceptually reframed. (Edwards & Usher, 2001:158)

Therefore, this interpretative process involves a series of discursive practices that organize, constitute, or create meanings within a given context. As Edwards and Usher state:

"Mapping and locating the discursively constituted meanings in and of practice and thus being able to translate between them thereby itself becomes a form of reflexive learning, which does not stop when one ends ones engagement with formal educational institutions" (Edwards & Usher, 2001:159)

In cultivating the global consciousness, the relational aspect of this reflexive mapping technique finds expression in theories of learning that place an emphasis on activities utilizing network concepts rather than the formal legibility of contexts. These contexts then are not fixed "things", but are outcomes of particular sets of interpretations gathered in a unique circumstance (Gruenewald, 2008:308). In other words, the act of contextualizing is much more important than the context itself. Practice and learning are inherently "poly-contextual", thereby allowing the formulation of interpretive tools with a greater range of usage in a wider variety of contexts (Edwards & Usher, 2001:162)

This flexibility encourages conventional concepts of knowledge transfer to be set aside for a method of learning that more easily lends itself to transgressing the traditional boundaries necessary in both understanding and navigating the rapid changes of globalization. Instead of focusing on an existing skill set, the interpretive practices themselves take on a different significance when net-worked into varying contexts. In short, they are readily translatable. With this, a student can understand the world as a series of fluid relationships/networks that transform with varying inputs. Embracing complexity and change becomes easier as difference and (dis) orientation are no longer feared, but seen as the norm. (Edwards & Usher, 2001:164) This is especially helpful in architectural education, for in the past this discipline has relied too heavily on its traditions and conventions.

GLOBAL STUDIO CULTURE: (DIS) LOCATING THE REFLEXIVE SPACE OF ARCHITECTURAL EDUCATION

In an essay on the future of architectural education, Daniel Friedman envisions a pan studio curriculum that sets about dissolving many of the traditional boundaries of US architectural education. This paradigm proposes the widening of the influence of building theory, introducing pedagogies that transgress or dissolve conventional disciplinary distinctions, and shifts the emphasis of teaching from the representational logic of linear perspective to the
more fluid and dynamic paradigm of virtual modeling. (Friedman, 2007:18) It seeks to challenge the existing institutional logic of the university to fully exploit the potential of Building Information Modeling (BIM). This software concept is not revolutionary or representational of a dramatic break from conventional practices in itself, but can offer the opportunity for continuous methodological adjustments from stimuli both inside and outside of the university. (Friedman, 2007:20) It is a vision similar to Taylor’s, but more specific to the study of architecture and design.

BIM technology allows the complexity of the design and constructive processes of architecture to be visualized and monitored within a central location. It allows architects, developers, engineers, contractors, and subcontractors to modify and design a building simultaneously in the third dimension and in real time. Through this ability to access building information as it is updated, issues of price, size, composition, and technical performance can be adjusted to avoid potential problems before they emerge in construction. It reinforces the notion that design has as much to do with knowledge and information as with talent. The ethos of the team becomes as important as the specific skill sets or talents of a particular individual. In addition to these positive attributes, BIM is a technology that could become an extension of the mapping and remapping processes described in the previous section. As Friedman insightfully questions: “What would a program look like if the same logic were applied to the delivery of instruction as to the analysis of complex systems—i.e., less a “core” than a flow or a fold? (Friedman, 2007:24)”

Metaphorically, what would happen if the studio component of the curriculum became the BIM technology of such a program? If this occurred, it could become the setting where all research, learning, and instruction would take place. There would no longer be the need to send students to isolated lectures in history/theory, structures, and environmental systems only to return to the studio with a rather esoteric knowledge base and no experience or instruction involving its proper application. The projects in the studio would serve as the framing mechanism for the course of study and information would be “mapped” onto a design problem or studio project in a reflexive manner. For example, a historian might examine the student’s current studio project and suggest several historical precedents involving similar social conditions, material and technological applications, as well as formal compositional principles pointing towards possible solutions to problems emerging within the design.

The student might then “virtually” leave the studio by accessing the information stored in the library of his/her university or those of other universities around the globe to research the suggestions. This information could then be mapped onto the project and essentially reframe the student’s outlook concerning the potential composition of the project. If the research was extensive, one could assume that a fair amount of architectural history is learned in the process. This procedure would be similar with other courses such as structures, theory, or systems. Assessment would be based on all aspects of the project from the quality and extent of the research to the sophistication of its application. Imagine the richness of the discussion concerning the level of success a design project has attained between a designer, historian, and engineer. After agreement is reached, one mark could be given with descriptions explaining how every aspect of the project affected the overall assessment.

This typology for learning could begin to dissolve architects’ penchant for an ideologically rigid view of the world. Perhaps this might just be the instructional structure involved in the training of what Keller Easterling has described as the architectural pirate. By this, the pirate is the improvising agent that serves as a determinate factor as to whether a discipline will be reclusive or open, information-rich or information-poor. (Easterling, 2005:195) Such an individual comprehends that
disciplinary boundaries are merely relational demarcations that can and should be transgressed according to the needs of a particular agenda. They are an agent that influences the structure as much as they are influenced by it through their navigation of its existing channels of information. The pirate realizes that the world is not static and each discipline or category, though clearly defined has within it flexible boundaries and fluid spaces of reflexivity. It is these types of spaces that entice such individual to explore, and hopefully to exploit what is discovered.

THE EDUCATIONAL SPACE OF THE 21ST CENTURY ARCHITECT / DESIGNER

What type of space would house the education of this type of architect? Are educational institutions defined by geographic locations and spatial/material demarcations even necessary or are there emergent educational environments that could foster a better connection to the needs of the network society and its educational goals? In a world where traditional concepts of space/place—once considered the epitome of stability and connection to the land—are being radically re-conceptualized, what constitutes the criteria needed to assess the significance of the places and landscapes we inhabit? Finally, how should our architectural education spaces be structured to underscore the necessity of comprehending these changes in the face of seeming overwhelming cultural transformation?

Answering such questions fully is outside the scope of this paper; however, they remain influential background questions. That said, the last question directly pertains to the present study and gets to the heart of the matter: How should we structure these types spaces to become more akin to those the student will find in the global society? Given the three conventional typologies mentioned in the introduction; loft, institutional, or economic, which one is the most appropriate in lieu of recent changes? More interestingly, do we need them at all? The answer to these questions is quite simple. Yes, we need them. In fact, we need all of them because the space for our BIM studio concept should be a combination of all three conventional typologies.

Though there is much rhetoric surrounding the demise of the influence of unique material space/place on our lives, the simple fact is that such spaces serve as signifiers of localized community space. (Smith, 2008:349-350) They emerge as spaces of diversity within the larger globalized network. The university campus in general, and architecture school in particular, aid in the signification and identity formation of their students. As K.C. Ho asserts:

*In times of globalization, community iconic structures can act as a counter balance to transnational iconic projects that often threaten to dislocate the local society. Because they are underpinned by social and civic relations of locals, community icons ensure greater cultural diversity, participation, and the reproduction of life spaces.* (Ho, 2006:91)

These types of community structures are outcomes of significant human agency at the outset of their creation and are usually the result of decisions by university administrators assessing their institutional needs. However, once the structure is built, it begins to have a profound effect on the organization of the social life of its faculty and students by outlining spaces conducive to particular sets of rituals. If accepted, (which is not always the case) these structures become the material representations of both a
communities’ identity and its solidarity. In short, their iconic stature is derived from the participatory efforts of a certain community of interest. (Ho, 2006:92-93)

The role of a community structure such as a school, church, or local civic institution is as complex as it is ambiguous. An architecture school within a university community is no different. How can it emerge as these three typologies simultaneously, as well as an iconic campus structure/space that change to meet the needs of globally conscious students? I envision spaces that are multidimensional and transform continually. As described previously, conventional spatial demarcations such as classroom, studio, and lecture hall will combine into a studio space that is, in effect, an open "loft" waiting to be transformed as needed. When a large gathering of individuals is necessary, moveable partitions can be repositioned to accommodate.

A similar circumstance might occur for a seminar discussion, but at a smaller scale. To provide such infrastructure, each semester groups of students would undertake projects specifically geared towards necessary modifications of their educational space. These projects would not be the "middle of the night" excursions as they often are now, but operations that would meet safety and code standards. Part of their educational content would be that the work be presented to the various regulatory bodies of the campus review board and local city building department for input and approval. Thus, students begin to attain a practical understanding of the building process in its entirety.

Such a structure would stand a good chance of becoming iconic because it would be the building on campus that was always changing, morphing, or transforming. The transient quality of its spatial form would be indicative of two things; the types of operations involved in educating architects and the more ephemeral/transformative quality that architecture must take to survive as a civilizing force in the global economy. Considerations involved in the third conventional typology, economics, could be met by insisting students obtain the materials for their projects by dissecting and disassembling derelict buildings. (Friedman, 2007:24) This would help offset the cost of the modifications as well as providing an avenue for learning how structures
were built in the past. It also provides an avenue to underscore the importance of sustainable practices to combat the emergent resource scarcity linked to globalization.

CONCLUSION: THE SPACE OF EDUCATION AS MANIFEST GLOBALIZATION

Some might argue that the previous discussion is utopian at best. That may be, but it is a utopia that we must strive to manifest. In the “acceleration of just about everything” spawned by many of the processes of globalization, (Hassan, 2003:169) the importance of the university in providing alternative spaces and temporalities offsetting the identity/diversity crushing forces of globalization cannot be underestimated. Universities might again become bastions of critical thought illustrating that the possibility of these types of alternative spaces and temporalities within our personal and communal lives. (Bowers, 2008:331) By cultivating spaces built on the imperatives of diversity and simultaneity, the monistic onslaught of the global network culture could be translated into a multitude of spaces and temporalities that add richness to the social, political, and cultural aspects of our lives. (Hassan, 2003:174)

Within architecture, this call is doubly important because it is this type of individual that will affect the virtual/material interfaces becoming more common as economic and technological transformations are felt globally. Consequently, it is imperative that spatial configurations involving architectural education be conducive to the exploitation of the integration of material/virtual cultures. This should be undertaken in a manner that underscores the importance of their integration both locally and globally (McLaren & Giroux, 1990:263). To date, architects have only really participated in globalization as the midwives to the material manifestation of the images of global corporate networks. Their influence can go much deeper into how we communicate globally and towards the reinstatement of the importance of richness and diversity of local communities.

It is up to the educational programs within architecture/design to reassert its influence as a civilizing force through the development of curricular agendas that reinforce the desire for a world comprised of both global and local communities. Learning through a practical example of what a continuously transformational space could be is an important step towards this goal. It should be a space or spaces that as the reconfiguration takes place, it reinforces the identity of the localized community supporting it. (Orr, 1992:130) With a typology of learning spaces whose manifestation and agenda seek to simultaneously confront and embrace globalization in all its ambiguity and complexity, educators move closer to reasserting architecture’s more conventional role as a purveyor of culture. University education in general, and design education in particular, runs the risk of marginalization if their teaching conventions/attitudes do not change to keep up with recent trends. Such marginalization will benefit neither our educational systems nor the disciplines they seek to reinforce. If this occurs, then globalization is truly a one-dimensional force. This is an event that neither the global nor the localized community can afford to let occur.

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SMART HOMES & USER VALUES
Edited by Ulf Keijer and Greger Sandström
Royal Institute of Technology
School of Architecture and the Built Environment.
Stockholm, Sweden.

This book discourses upon Smart homes and User values. Its aim is to contribute to bridging the gap between technology and user values in the home setting. Most smart home projects address technology development, albeit often with some application of the technology in mind. In the book the other view is taken, starting with the users’ experiences and bringing it back to technology, organisation and service delivery. Evaluations of smart homes in use are presented. User perspectives on, i.e. ordinary residential living, assistive living and digital services are covered. Presented results indicate how society, the real estate industry and the individual residents may benefit; and the prerequisites for it. The book contains evaluations of smart homes in Europe, Asia and North America. The book constitutes the state-of-the-art in the field, indispensable for the construction and the real estate industry, developers of the systems and technology, other professionals in the field, institutions, students and everyone interested in new technology for homes and everyday life.

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DESIGN STUDIO PEDAGOGY: Horizons for the Future
Ashraf M. Salama & Nicholas Wilkinson (editors).

This groundbreaking book is a new comprehensive round of debate developed in response to the lack of research on design pedagogy. It provides thoughts, ideas, and experiments of design educators of different generations, different academic backgrounds, who are teaching and conducting research in different cultural contexts. It probes future universal visions within which the needs of future shapers of the built environment can be conceptualized and the design pedagogy that satisfies those needs can be debated.

Addressing academics, practitioners, graduate students, and those who make decisions about the educational system over twenty contributors remarkably introduce analytical reflections on their positions and experience. Two invited contributions of N. John Habraken and Henry Sanoff offer visionary thoughts on their outstanding experience in design pedagogy and research.

Structured in five chapters, this book introduces theoretical perspectives on design pedagogy and outlines a number of thematic issues that pertain to critical thinking and decision making, cognitive and teaching/learning styles, community, place, and service learning; and the application of digital technologies in studio teaching practices, all articulated in a conscious endeavor toward the betterment of the built environment.

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MANAGING URBAN DISASTERS

Volume 31 No.1 March 2006

Guest Editor: Christine Wamsler, Housing Development & Management (HDM), Lund University, Sweden

The focus of the special issue on "Managing Urban Disasters" is concerned primarily with identifying and describing existing projects, experiences and best practices from Africa, Asia and Latin America, which are already working with new integrated approaches to risk reduction. These link different stakeholders and levels, and do not focus only on the technical, but also on the social, economic and political aspects. The articles discuss questions regarding those factors that determine the vulnerability or resilience of cities, and describe concrete projects in the field of housing and urban development planning, which can reduce the disaster risk for low-income settlements. "Managing Urban Disasters" was conceived with the intention of providing a balanced selection of topics, hazards, and countries. Specific topics relate to appropriate housing design, construction materials and techniques, land use and urban development planning, policies, legislation, governance, as well as related advocacy campaigns, institutional strategies, methods and tools. Based on the understanding that emergency relief, reconstruction, mitigation and development aid may be viewed as complementary to each other, rather than conflictual, the articles cover all the mentioned fields.

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