

PLANNING TO LEARN: THE ROLE OF INTERIOR DESIGN IN EDUCATIONAL SETTINGS

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This design case is about re-engaging with the fundamental role of the built environment in order to support the educational process and overall learning experience in a private Catholic school. Advanced level interior design students were provided an opportunity to work with a school whose administrator had requested assistance in setting priorities for needed changes to their grade school facility. The current building presented limitations in reflecting the high quality curriculum teachers delivered to their students, and they sought ideas for improvements that would support their goals. The design case describes a sequence of pedagogically based steps that were strategically employed through a service-learning project to help students explore user experience, apply theory, and develop design solutions using an evidence-based research framework. The goal was to plan learning spaces for pre-kindergarten through third grade school children. The interior design students first explored the theoretical perspectives of early childhood education and the role of the built environment as a significant component of the educational process. They then analyzed the existing conditions to create priorities for change, verifying this information with multiple user-groups. A comprehensive design program was developed from this information. Finally, student teams prepared design solutions that visually represented potential answers to the identified problems. Student, faculty, and client perceptions of the design process are presented in text and audio formats. Outcomes of the case study are discussed in the context of the benefits to the various user groups and participants, as well as the value of returning to the fundamentals of the educational experience through the human perceptual and physical interactions with the built environment.

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INTRODUCTION

American children spend a significant amount of time in a classroom setting. Many of these environments are in older buildings with outdated environmental systems such as heating and cooling, lighting, sound, or other acoustical controls (Mendell & Heath, 2005; Evans & Maxwell, 1997; Hygge, & Knez, 2001; Melkin et al., 2005). Student performance in school has been shown to have a relationship to the quality of the building (Chan & Richardson, 2005). Sensory stimulation can both enhance and detract from the learning process of a young child (Day & Midbjer, 2007). Visual, tactile, and auditory senses are crucial in learning and need to be considered in the design of the built environment. Many teachers and students, however, are coping with inadequate classroom spaces, outdated buildings, and deteriorating interiors. Poor quality environments can create learning barriers such as impaired concentration for many students who will be distracted by negative attributes in these enclosed interior spaces (Mendell & Heath, 2005). These impacts are especially significant for younger children



FIGURE 1. Manhattan Catholic School main entrance view.

in elementary school settings who are more susceptible to negative environmental stimulation.

Interior design strategies for elementary school settings, therefore, have the potential to substantially influence the learning and developmental needs of children (Rinaldi, 2006, Curtis & Carter, 2003; Lynch & Simpson, 2004). Young children benefit intellectually from experiencing their environments. Since much of their education is based in interior settings, the influence of these environments cannot be underestimated. In today's educational systems, there are also a wider range of developmental needs, learning styles, and physical abilities (Martin, 2010), and successful educational design nurtures and encourages this range of user needs.

Too often, educational programs are located in spaces that do not provide the supportive environment necessary for teachers to deliver, and for students to experience, a rich learning climate. Architects and designers who plan educational settings may also lack a deep understanding of the ways that children develop and how the physical environment of classroom space contributes to this process.

This design case describes a design process-within-a-process concerning two related goals: 1) what occurred when teaching interior design (ID) students how to understand the role of the built environment in supporting the educational process and overall learning experience of children; and 2) the process of having those ID students develop and provide built environment recommendations to real clients that would improve children's learning outcomes. Advanced level interior design students were provided an opportunity to work with Manhattan Catholic School (MCS), a private

educational organization located in Manhattan, Kansas, a community of approximately 50,000 (Figure 1).

MCS was established in 1908 and is located in the historic semi-urban core of the city. The school's senior administrator, the principal, requested assistance in setting priorities for making needed changes to their grade school building, which serves approximately 170 children from pre-Kindergarten through third grade. It was observed by the principal that prospective families were more attracted to newer, primarily public, schools in the district because they associated a more modern environment with a more progressive educational experience. He was concerned that the physical condition and appearance of their current grade school building presented limitations in reflecting the high quality curriculum that MCS teachers delivered to their students. Furthermore, as a long-standing component of the community, administrators and teachers wanted their environment to reflect the school's mission and Catholic identity as well as its historic heritage and future potential. Outcomes of the design case will be discussed in the context of the benefits to the various user groups and participants. The authors found benefits to students and the client alike in the project's attention to the fundamentals of the educational experience by suggesting design strategies to enhance the human perceptual and physical interactions with the built environment.

CONTEXT OF THE PROJECT

Two interior design faculty members in the College of Human Ecology at Kansas State University were approached by the principal of MCS and asked to engage interior design

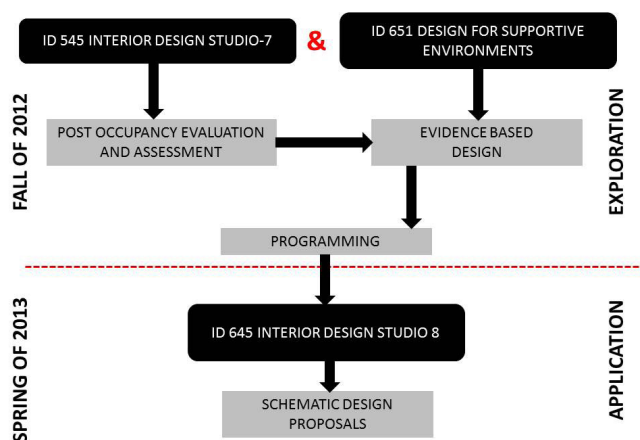


FIGURE 2. Process for incorporating MCS Project into the interior design curriculum and diagram of the project sequence.

students in a process that would demonstrate the potential future of the MCS grade school. Initial conversations with the principal revealed assumptions about the limited opportunities for change of the built environment within their current building because of its age and configuration. Built in multiple phases during the 1950s through the 1970s, the building presented numerous architectural challenges. Informed by their background in environment and behavior research, the faculty also observed through these conversations that teachers in the building had been compensating for environmental deficits for so long that they had lost touch with what the potential role of the interior environment could play in supporting the delivery of their curriculum. This created a ripe educational situation to teach advanced level interior design students an evidence-based design approach to developing an effective design program. This design case describes a sequence of pedagogically based process steps strategically employed to help students explore user experience, apply theory, and develop design solutions using an evidence-based-research framework. The general goal was to properly plan learning spaces for the pre-Kindergarten through the third grade in a manner that respected the mission of MCS: “to provide an excellent, traditional Catholic education to prepare our students to become Catholic disciples in an ever-changing world.”

Instructional Methods

Based on initial discussions with the principal, a student service-learning project was developed and organized by three faculty members (the two original faculty contacted and another faculty teaching a senior-level studio). Because of the comprehensive nature of this project and its scope and significance to the client, the schedule was structured so the project spanned three advanced level interior design classes led by each of the three faculty in the form of two studios

and one lecture course with a lab component composed of junior and senior level interior design students. These classes occurred over the course of two semesters with a common cohort of 36 students (Figure 2). During the first semester, a studio course guided the students through a post-occupancy evaluation (POE) and assessment process of the existing school described below as Phase 1 Environmental Analysis. A separate lecture course that same semester then guided the students through a design programming process described below as Phase 2 Programming, which incorporated evidence-based design strategies. During the second semester, a second studio course guided the same senior-level students through schematic design solutions to apply the programmatic criteria detailed below in Phase 3 Schematic Design.

Faculty members in the Interior Design program were excited to have the opportunity to use this project type as an educational experience for ID students. Educational settings are often not the focus of projects in the current curriculum and this offered students both a real setting as well as a different set of users and design criteria to work with. Because the client was in the early stages of considering change, the project also offered students an opportunity to define the problem and project goals based on observable environmental variables, user input, and evidence-based design research. Since the faculty involved had a combination of design practice and design research experience, they were well-suited to guide the student teams through this process within the limited time frame that was required in order to complete the project and not infringe on other curricular requirements.

DESIGN PROCESS

Phase 1: Environmental Analysis

The first phase of the project was initiated in an advanced level interior design studio. Background information on educational project types and the history of the MCS project site were collected from published materials available on the internet. These initial findings were discussed, prompting ID students to prioritize relevant information. Two practicing design professionals with experience in educational project types shared critical information at the beginning of the process about how to think about educational spaces. Studio faculty then introduced basic environmental assessment strategies for collecting physical information about the school building as well as strategies for obtaining user feedback regarding the functional use of the various spaces. These primarily included observing physical trace evidences and patterns of use, such as wear and tear of the finish materials, evidence that users had modified their spaces to accommodate their needs in ways that were not originally intended, and displays of personalization such as student artwork or group identification for the various classes (Zeisel,

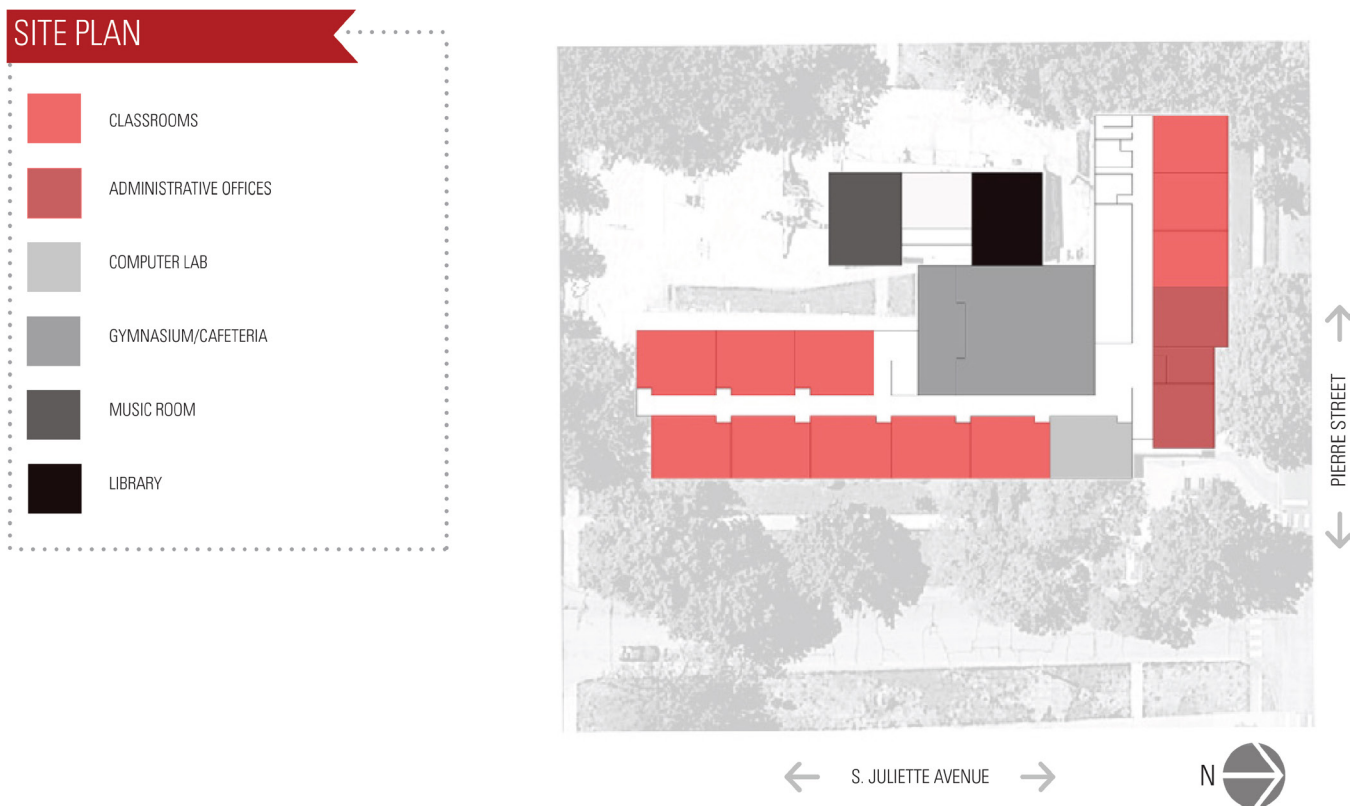


FIGURE 3. Floor plan of existing grade school showing zones for team assignments.

1981). These strategies were employed because they are easily observed and unobtrusive. Observing patterns of use was also effective as the patterns prompted further questions regarding other experiential qualities of the setting, which could be asked in the follow-up interviews with teachers and students. To expedite the information gathering process, the class was divided into six teams of six students each that were assigned particular sections of the building (Figure 3). The faculty decided on this group approach because this is the way that a professional design office would approach a similar project.

Each student team was responsible for becoming familiar with their particular targeted areas. They made two visits to the site and investigated each designated space with consideration for functional design characteristics, security, equipment needs, finish selection, and aesthetic properties. These characteristics were chosen because several were initially identified by the principal as problematic. The ID faculty also recommended additional key characteristics for student consideration based on their knowledge of environmental and behavioral factors.

During the first three hour visit, students interviewed teachers and administrators to understand the existing environmental and spatial conditions in each of the areas. The teams took photographs and field measurements for their respective zones for use in their analysis reports.

A three-hour follow up visit was conducted to interview the approximately six teachers and 36 students (in groups of 5-8 from each grade level) to obtain their feedback and observations about their classroom spaces (Figures 4 and 5). Teachers were queried about environmental features that supported or inhibited their curricular goals. The grade school students were also asked to provide their perspectives and opinions on their classrooms. In the audio clip with Figure 5, the principal shares his observations of the interview process.

Based on these visits, each group compiled an analysis report outlining the issues related to each room in the building. In this report, the ID students identified what they considered to be a problem (e.g., an “unsecure and inaccessible side door”) and then provided an explanation of the issue (e.g., “there is not a restricted locking mechanism on the playground door; multiple keys have been distributed, which is a safety concern. There is no automated door opener, which makes it difficult for handicapped visitors to enter and exit the space.”). Problems identified included material wear and tear, circulation challenges, accessibility issues, code compliance issues, and general observations on functional use. All problems identified included information presented in both photographic form as well as written narration (Figure 6).



FIGURE 4. ID students interviewing MCS students during the analysis phase of the project.



FIGURE 5. ID students interviewing MCS staff members (with audio from the MCS staff focus group interview).

This report was submitted to the principal of MCS and was reviewed by both teachers and administration. While the ID students did not review the report in person with the client, comments were returned to the ID faculty regarding areas of clarification. The principal noted that feedback from the teachers indicated that the ID students had done a comprehensive job of identifying and articulating problem areas of the building, including areas that were previously unrecognized by the teachers and staff. The analysis was subsequently revised based on feedback.

A summary of the analysis demonstrated that the age of the building and the antiquated infrastructure was a source of frustration among students, teachers, administrators and staff. Years of marginal enhancement and inconsistent facilities maintenance had notably reduced the quality of the interior spaces. Challenges such as safety and security for entrance and egress, accessibility, sustainability, as well as organization and lack of storage affected the way that users of the space interacted.

For example, the interface of the interior environment with the building systems including heating, ventilation and air conditioning (HVAC), and lighting were primary programmatic criteria brought to the attention of the students by teachers in the interviews. Thermal comfort was a consistent and major concern for the teachers of MCS. They noted that keeping the interior ambient environment comfortable for their students created challenges in the acoustical environment. At times they have to shout over the drone of the wall-units that have been added to the rooms to assist with cooling.



FIGURE 6. Preliminary Problem & Analysis report submitted by Interior design students.

Many of the teachers reported that they had learned to adapt to the various issues which caused problems in the classrooms. For example, the HVAC system's lack of consistency in providing thermal comfort resulted in the classrooms either being too warm or too cool. Wall-unit air conditioners created additional acoustical issues, and covering supply vents to block air that was too warm during the winter months resulted in deterioration of other surfaces. Correcting these problems would be a significant improvement that would allow teachers to focus on curricular goals, and allow the students to focus on learning.

Reflections on Phase 1: Environmental Analysis

A group of five interior design students participated in a post-project focus group to provide feedback on the experience of the service learning project and its process. Overwhelmingly, the students felt the opportunity to work with an actual client created a stronger sense of commitment to the project outcomes. One student commented:

As interior design students we are here to better the environment for these children and the faculty so actually seeing the problems helped us come up with solutions.

The students also valued the first phase's process that assessed existing conditions and helped the students understand the clients' needs.

The first time was wrapping our head around the project, the second time (we visited) we really dug deep into the problems of the specific rooms, stuff like flexibility and storage, so we really tried to focus on the subject of study.

Engaging the users throughout the process was also considered extremely valuable:

Definitely speaking to all of the staff there and the children too, you got their input too, so not working with them, you don't really know the inside scoop on what needs to

be changed...I think you really need the client's aspect;... you can't just yourself try to figure out what needs to be changed.

The MCS staff also remarked on their experiences of the interior designers' first phase process approach. They noted that the process allowed for multiple points of interaction with the interior design student teams and this provided the different user groups the opportunity to contribute. One of the teachers commented:

What I liked was that they listened to what I had to say, whatever questions they had, I came up with some things that I wanted to see changed, they wrote everything down. They were very good at listening and putting down on paper and giving suggestions about what they could do to improve the classroom.

The Principal also noted that:

they came very well-prepared to ask those questions. At one point they toured the building, and the second time they came back, the questions were more in-depth. And it really focused on a lot of things that when we go through the building we take for granted or don't see because it's there in front of us every day. They hit all those small details and that was very nice to see.

Phase 2: Programming

At the end of the environmental assessment and analysis phase, the next steps of the MCS project were incorporated into a lecture course the students were also completing that same semester. This course, which included a companion lab section, focused on understanding the process of using evidence-based design findings and design research tactics to inform the planning and design of user-targeted spaces. The specific project emphasis in this course was to review the literature on child development and the philosophies



FIGURE 7. Stone House.

of using the built environment as the “third teacher” (Greenman, 1988).

Stone House Early Childhood Education Center

In order to understand the applications of the theory of learning to the built environment, the design students accessed a case study of an educational space by visiting an early childhood learning laboratory on the K-State campus, the Hoeflin Stone House Early Childhood Education Center (Stone House). Stone House is a teaching laboratory that provides educational programs for young children as well as a teaching and research lab for early childhood educators (Figure 7).

The design of Stone House provided an articulated example of how a setting can influence growth and learning for young children. Guided by Dr. Bronwyn Fees, faculty researcher in early childhood education, ID students were provided with insights into how the built environment plays a significant role in learning and development in the formative years of a child’s life. This tour was followed by a presentation and discussion in a subsequent class session to talk about observations made at the Stone House facility and to address questions based on the literature the students had read.

Starting with a foundation of child development and how children “learn through play,” students were introduced to theories of learning and the role of the built environment. For example, ID students learned how children’s full engagement with elements of their environment taught them the basic principles of science and mathematics.

The authors observed that these experiential interactions with early childhood learning laboratories and early childhood researchers provided the design students with clear examples of why the design of interior space matters. Through the visit to Stone House, the interior design students observed how learning is a cognitive, sensory, and kinetic interaction with information. For example the ID students learned that selective use of color in the interior environment can assist in creating a visual backdrop for the creative work of grade school students. They began to understand the significance of planning and designing learning spaces that could successfully incorporate these multi-modal interactions (i.e., cognitive, sensory/ perceptual, kinetic) and foster experiences which engage children and enhance their developmental processes.

Final Program Development

Following the visit to Stone House, student teams then began the process of writing a comprehensive building program that would define the project goals and address the necessary design modifications in order to create a more supportive learning environment for MCS. Faculty guided the students in synthesizing feedback from the many resources encountered thus far: the Phase 1 analysis report, site visits to the Stone House Early Childhood laboratory, presentations and discussions with experts in early childhood development, and a review of the literature on the role of the environment in child development and education. The student teams had two weeks to assemble their data and complete their sections of the report. This compressed schedule was deliberately planned so students would have the experience of making informed decisions quickly, similar

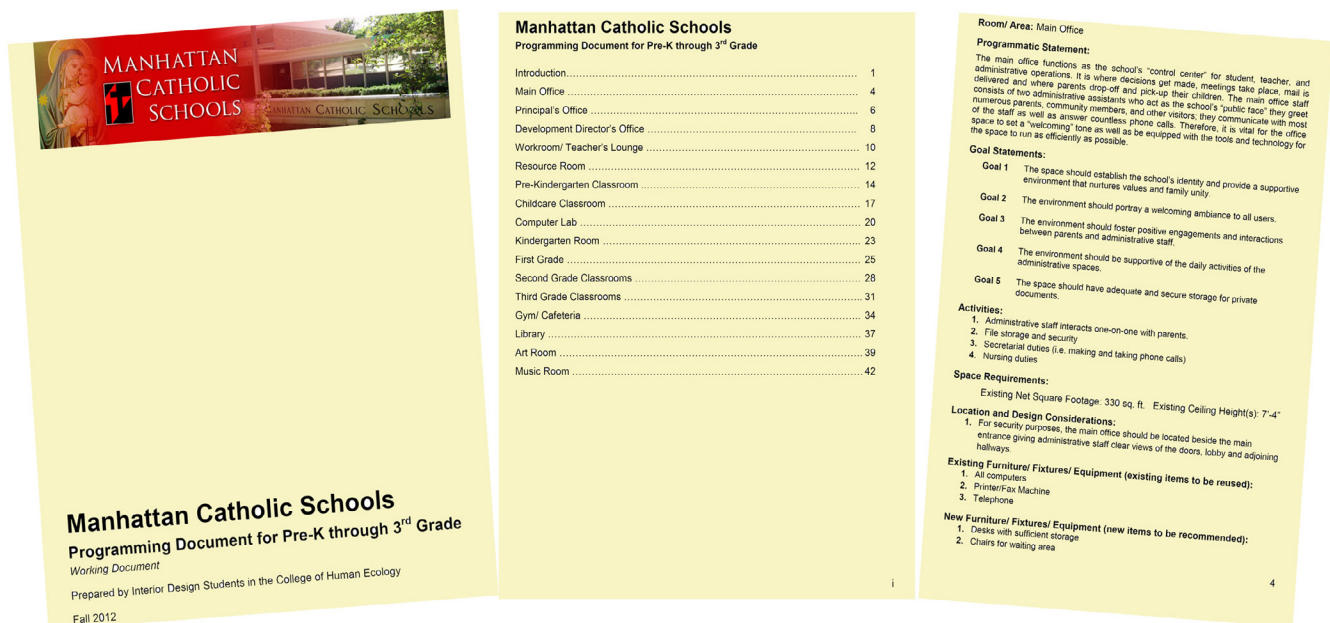


FIGURE 8. Final MCS Program.

to what is required of professionals during fast-track design processes.

The objective was to envision and articulate design solutions for MCS that reflected the quality of the education being provided. Group discussions with the faculty and students facilitated the development of design strategies that included providing for current technologies. Also, it became clear that it was important to include modern teaching approaches to prepare students for the future while embracing and celebrating the rich history of the teachers, students, family, and clergy who have made MCS a part of the Manhattan community.

The ID students' program descriptions of each of the rooms within the building were envisioned to address the requirements based on user comments and attributes reflected through the design research literature and prior expert consultation. Due to the limited time frame available, faculty provided the ID students with a template used in professional design practice which outlined categories that were of focus in this project (Figure 8). These requirement categories included goal statements, activities performed in each of the spaces, space requirements, locations and design considerations, existing furniture to be re-used, and special requirements for environmental conditions, material selections, and building systems.

Key programmatic areas of psychological support that emerged included aspects of safety and security, wayfinding, school identity, and place making. Other areas of focus included accessibility, ergonomics, technology integration, thermal control, energy conservation, durability of materials, and storage. Faculty anticipated these types of issues based on initial conversations with the principal and coached students on strategies for identifying these areas. The ID students' program proposals were naturally limited by the context of the existing architecture of the school as opposed to ideal situations that might be intrinsic to a new facility.

Through the programming process, the ID students explored the theoretical perspectives of early childhood education and the role of the built environment as a significant component of the educational process. For example, in considering that young children are highly experiential learners, the ID students were attentive to details that would allow children to have autonomy in their learning environment. They used the analysis of the existing conditions, which emerged from the first report, to establish the priorities for change. From this information and the relevant literature, all teams contributed to a single comprehensive architectural program that incorporated evidence based design strategies in proposing appropriate solutions. The report began the process of translating content from abstract ideas to tangible goals—for example, addressing environmental systems

such as lighting and acoustics based on information found through the design literature on educational spaces.

This program was delivered to the principal, who shared the report with teachers as well as members of the school board. Minor additions and corrections were noted and returned to the ID faculty who reviewed the edits with the ID students and assisted them with corrections and clarifications for a final draft. This final draft was then returned to the principal. This draft was also used as part of the evaluative process on team performance. Teams that had not accurately cross-referenced content were coached on how to improve communication among team members.

Reflections on Phase 2: Programming

During the Phase 2 programming stage, the students reflected on the value of gaining perspectives from other experts as well as their investigation of educational spaces that had been specifically designed to address children's developmental needs. The visit to the early childhood learning lab and the conversations with the researchers was seen by the ID students as a significant source of insight into the project.

Talking to the faculty in both situations, the Stone House and the Manhattan Catholic School, was of great importance to this project because it's their job to shape the minds of these children, and it's our jobs to shape the environment. So this connection with the faculty and students was really beneficial.

Another student noted:

it was a really tremendous mutual benefit, because as designers we were able to have a much more holistic sense of the solution because we knew the ins and the outs instead of just having the project goals delivered to us and then going from there. We were able to wrap our heads around it, use design better, make those better solutions for the client.

While the outcomes of the written program were positive, faculty noticed that the process of articulating detailed design criteria in written format was initially difficult and sometimes frustrating for students. For this reason, the purpose of a professional design program was often revisited in faculty-student discussions. Once the ID students recognized the value of the information they were recording, it was easier for them to be more critical of the content and identify where information needed to be expanded.

Phase 3: Schematic Design

The final stage of the process resumed the next semester when the project was continued in a final capstone studio. This phase of the project involved student teams each developing a potential design solution to the programmatic issues identified in the previous phases. This is a typical sequential



FIGURE 9. Final presentation at MCS.

step in the design process in which the designer proposes a creative solution, in conceptual form, to the client. A fourth faculty member joined the project's three existing faculty for this phase, co-teaching the studio class.

Student teams were restructured so each of the five resulting groups had members who were knowledgeable about each of the program areas. Each of these teams was to develop a digital presentation that detailed a unique solution based on the architectural program. The teams had a three week period to develop schematic-level design solutions to graphically depict answers to the problems identified and how the current grade school building could be revitalized. The intent of this was to show the building's users (and the ID students) how a single design program could result in a variety of design options for consideration. The expedited schedule forced the student teams to assimilate the overall program into practical solutions quickly and demonstrate how they could apply what they learned through the assessment and programming phase by the design criteria they decided to prioritize.

The teamwork aspect of the MCS project proved to be tacitly beneficial for the students as they realized that the quicker they began to work as a team the more potential schematic solutions to each programmatic issue they could generate. This forced them to quickly overlook personal preferences and biases in favor of collective ideation. Given the rotation of team members, the short time frame and the reality of the project the ID faculty felt that the teams performed at a professional level.

At the end of this process, each of the student teams were allotted 20 minutes to make a formal presentation to an audience of approximately 20 teachers, administrators, school board members, and parents (Figure 9).

Some audience participants were seeing the project for the first time; others had been involved in providing design

guidance. Presentations were projected onto a screen and described first by the students, and then questions and comments were fielded from the audience.

Interactions from the audience tended to focus first on budgetary numbers that had been provided in general terms (e.g., approximate cost per square foot) by the student teams. While the desire for budgetary information was expected, the number of questions keying on budgetary figures was unanticipated by the ID students and faculty. It is possible that members of the audience were not fully informed of the scope of the student project. Faculty assisted in answering some of these questions so additional questions about design considerations could be further explored. As this was a culminating presentation at a schematic level with five different solutions, no attempt was made to modify designs during this presentation process. A copy of each presentation was left with the principal in a bound and digital form.

Primary goals from the program emerged in the student-generated discovery process and schematic designs. These goals included addressing entrance and security, conveying a clear branding concept that reflected the identity of the Catholic school, appropriate ergonomic supports for children, dealing with acoustical issues, enhancing the lighting and visual aspects of the classrooms, providing better storage options, and material selections that supported indoor air quality. Some of these criteria are further detailed below.

Entry and Security

Safety and security is a primary concern for today's educational environments (Trump, 2011; Maxwell, 2000). Each of the five schematic proposals articulated an idea, or concept, for a new entry sequence for the building to address the needed security and monitoring of doors and hallways (Figures 10 and 11). These spaces were also designed to create a sense of welcome and showcase the brand of the MCS organization. These spaces focused on strategic use of light, color, and spatial composition allowing for both visual and physical control of the front door while avoiding an overly institutional impression. The audio clip with Figure 11 illustrates the student's experience further.

In addition, the students addressed security issues throughout the building by suggesting hardware upgrades to each of the classrooms doors. Current hardware required that the teachers step outside of the room to lock the door; the ID students suggested mechanisms that could be quickly secured from the inside of the room in the event of a building lock-down.



FIGURE 10 (left). Existing interior hallway at the entry of MCS.



FIGURE 11 (right). Proposed new interior hallway at the entry of MCS with audio of an ID student sharing her observation on how school safety became a topic of focus.

Conceptual Development of Identity

As a private, faith-based school, it was important to the users of MCS that potential designs reflect the client's ideals. Proposed solutions for the entrance demonstrated a dramatic opportunity to celebrate the identity of the school by incorporating symbols of the Catholic faith through significant architectural features (Figures 12 and 13).

The administration also wanted to emphasize the long history of the school as well as their progressive future. The ID student teams proposed designs that incorporated multiple display opportunities for legacy walls, donor recognition, and presentation of student work.

Ergonomics for Children

Based on the reviewed research on educational settings a supportive ergonomic environment was another significant feature that affects student health and academic performance. This is especially critical in classroom settings where students will interface with technologies that require key-boarding and use of hand controlled digital devices (Murphy, Buckle & Stubbs, 2004; Straker & Pollock, 2005). Within the classroom designs, much attention was given to providing flexible work surfaces, seating, and storage to accommodate a wide range of users. The ID student teams were attentive to the anthropometrics of the grade school student user groups. For example, the users of the computer room spanned from five years of age to thirteen, representing a wide range of developmental needs and statures. Furniture



FIGURE 12 (left). Existing exterior at the entrance of MCS.



FIGURE 13 (right). Proposed new exterior at the entrance of MCS with audio of ID students discussing the significance of the faith component to the school's identity.



FIGURE 14 (left). Existing computer room at MCS.



FIGURE 15 (right). Proposed furniture layout for increased flexibility in the computer room with audio of ID student talking about the importance of selecting appropriate furniture to accommodate different developmental stages.

selections addressed these needs by providing maximum adjustability wherever possible (Figures 14 and 15). The audio clip with Figure 15 describes the student's focus group interview conversation on this point.

The Acoustic Environment

Young children can have a heightened sensitivity to sounds, and they are particularly vulnerable to vibration, reverberations and noise (Olds, 2001). Confusing acoustics reduces a child's understanding and attention (Day & Midbjer, 2007). Like many older educational settings, one of the sources of negative acoustics in the MCS classrooms originated from the heating and ventilation systems. While specifying a more appropriate HVAC system was beyond the scope of interior design students, the students did account for those interior details that would minimize the negative acoustic experience. Proposed improvements in the acoustic quality of the classrooms included soft flooring surfaces and new ceiling systems with higher STC (sound transmission class) ratings.

The Visual Environment

The visual sense of a child is stimulated in his or her learning environment through the use of color, light, texture and material (Read & Upington, 2009). Many of the student team solutions addressed the quality of both artificial and natural lighting. This was a criterion that was expressed in both luminaire selections as well as more flexible window treatments for large spans of glazing in classrooms to control glare. The ID students had to address the large spans of windows in a manner that did not eliminate the opportunity for the MCS students to benefit from the natural light but also helped to control the heat gain and direct glare that resulted during certain times of the year. Window treatments that had light filtering properties, adjustability, and thermal control were frequently recommended through the designs.

In addition, students applied previously learned content on environmental systems and lighting as well as background research completed on visual perception and glare to specify appropriate interior materials. ID students were sensitive to suggesting finishes that would minimize reflective glare from the east and west facing windows in the classrooms.

Storage

Throughout the building, a lack of organized and flexible storage was consistently noted by the teachers. Closets and storage spaces that were available were often not equipped with the type of shelving or amenities that supported the equipment and supplies that were being kept. Each of the design teams carefully considered how accessible storage areas could be incorporated directly into the classrooms, and their design ideas proposed flexible types of storage so the grade school students could also be involved in retrieving items or putting items away.

Indoor Air Quality

Quality of the indoor air was an environmental assessment issue and programmatic criteria that addressed sustainable thinking in a variety of ways. The first was through the proposed finish specifications. Students articulated sensitivity to selecting non-toxic finishes and materials that would be low volatile organic compound (VOC) content. Many of the rooms were experiencing difficulty with moisture control as well, so carpeting that provided moisture barriers as well as anti-microbial properties were also recommended. Also, considering the age of the building interior, design students were sensitive to the impact of demolition on the potential release of hazardous materials that may be hidden within the current construction such as vinyl asbestos tiles, asbestos based plaster in the walls and ceilings, as well as insulation

wrapped pipes. Therefore, the final solutions attempted to minimize the amount of demolition required.

Reflections on Phase 3: Schematic Design

Once the student teams began the phase 3 schematic design process, they were challenged with a short time frame forcing them to understand how valuable the program was in helping them prioritize the goals. One student noted,

Getting specific with the lighting, heating, glare, being able to consider in-depth every aspect and how it impacts the school day was really important. The way they use the room is impacted by these variables.

The students valued the multiple sources of information they used to understand the opportunity for their design decisions to make a positive impact on the learning.

Just understanding the environmental psychology, and how people will interact in the space, or how someone learns... I never realized how much impact designers have, just thinking back to when I was in grade school, I never really thought about who designed this room... it really makes a difference.

Furnishings were clearly a targeted priority for the student teams as they addressed aspects of ergonomics for diverse users.

Ergonomics plays a key role; a lot of the time students are sitting during the day, and it [the work surface] should be the right height. Collaborative areas that had flexibility, being able to be more mobile [were important design considerations], just being comfortable.

Another student commented,

I was working with the computer lab and that's a space that has to be universal because you're catering to the grades from pre-K all the way up to 6th or 7th grade. And being able to have that flexibility in the furniture really makes a difference because we were observing one class of kindergarteners and there were children whose feet weren't even touching the floor sitting in those chairs then we observed a class of 5th graders and they were almost spilling out of those chairs, so that flexibility is really important.

The ID students worked to bring a cohesive feeling to their solutions.

I think the overall atmosphere that you feel is really important... just feeling comfortable and welcome in your learning environment is important, you're more likely to stay longer and focus if you're comfortable in your environment.

MCS teachers said that the students returned an accurate reflection of the priorities of the teachers, students, and administrators. Interestingly, the teachers began to really see the interior environment in a new way; the role of the

environmental quality and the implications for a quality learning environment became clearer for them. One teacher noted,

They mentioned the lighting quite a bit. And we have those old fluorescent lights, and I only know this because mine is flickering quite a bit today in my room... as I'm watching the kids trying to take a test, and the light was flickering, it really brought it home that changing the light can really change the atmosphere in the classroom.

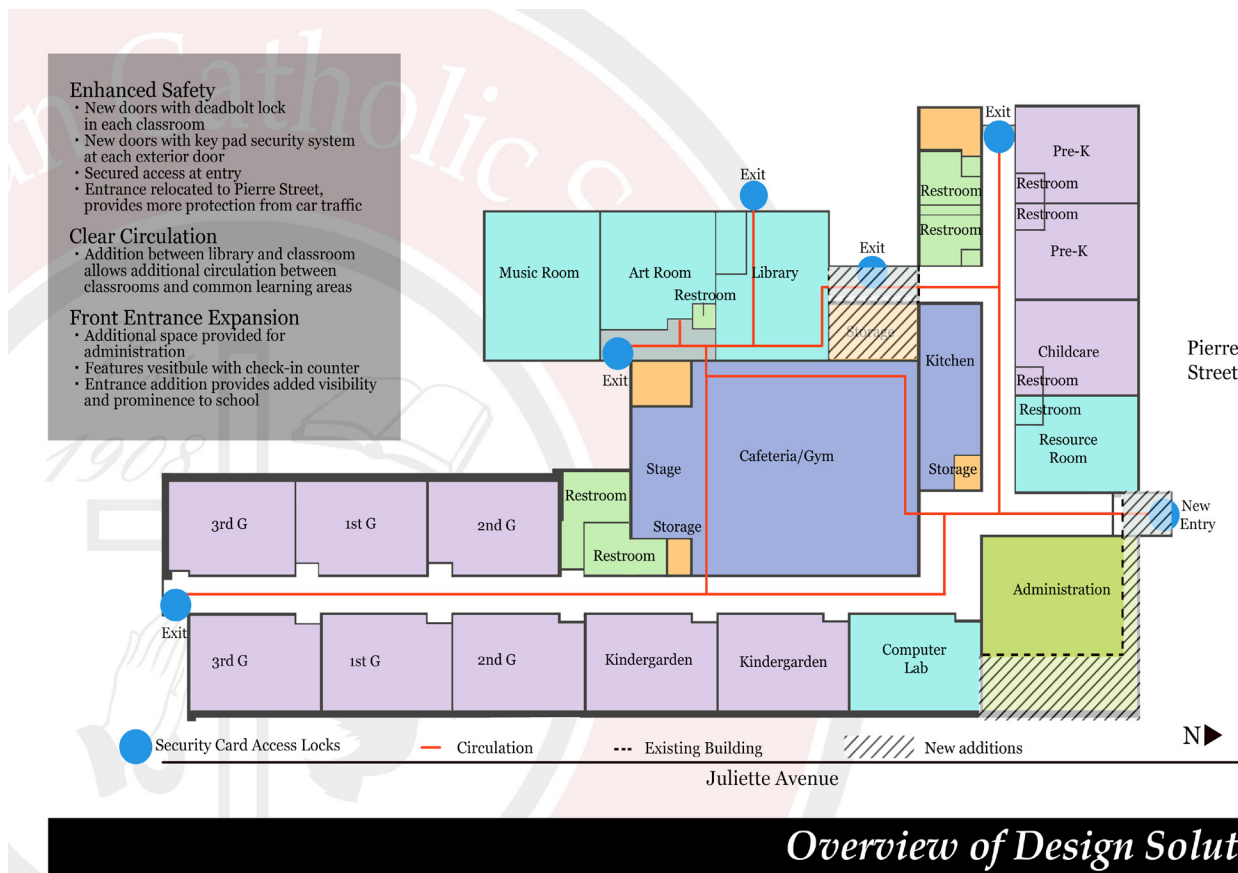
Another comment focused on the balance between thermal comfort and acoustic quality.

My room is really, really warm. We open up to the playground so opening up the window isn't always the greatest of options, because it might get your room cooler, but it also brings in more noise, and that certainly does affect the kids and their behavior and how much learning can go on in the classroom.

Overall, the ID faculty members were pleased by the richness of the learning experience and depth that the ID students went to investigate both the users' design problems and the research evidence that helped inform their schematic design proposals. While some of the solutions were clearly more successful than others, each of the presentations addressed at least some of key criteria that were identified through the analysis and programming phases. Projects that were less successful may have been encumbered by difficulties with team dynamics as some teams struggled to agree on design priorities. This problem could have been dealt with more effectively by the faculty if more time had been allocated for Phase 3 of the project.

The clients' expectations for budget information was also something that should have been expected at the onset of the project, and worked into the discussions with the students at a more in-depth level earlier in the programming phase (Phase 2). Students did perform high-level construction estimates using square foot quantities based on industry standard data. It would have been helpful, however, if those guests who attended the presentations had been informed that the student design ideas were schematic in nature, and finite construction estimates were not possible at this stage of planning, even for experienced professionals. Once the guests understood the nature of the schematic level presentations, this approach to the budgeting was understood and appreciated.

As with the budget information, there were also some members of the audience that expected more detailed information on environmental systems (e.g., HVAC) than was appropriate for schematic level presentation. Again, a brief primer to prepare the audience for the focus of the design ideas would have helped alleviate some of these detailed questions. However, the faculty felt that it was valuable for students to experience and witness "on-the-fly" questions



Overview of Design Solution

FIGURE 16. Building Safety Solution.

from participants as this is a natural part of a typical presentation process.

Feedback from the principal, however, indicated that those who viewed the student presentations were impressed with the process and the resulting ideas. These presentations have been subsequently used for promotional and development purposes to raise interest and support for moving the project forward.

FURTHER POST-PROJECT OBSERVATIONS

There were multiple outcomes that provided value to this experience for the ID students and faculty.

The Value of the Process for Learning

First, faculty felt the sequential process of problem identification, design programming, and schematic development was a successful method of teaching ID students how to understand the role of the built environment in supporting the educational process and overall learning experience of children. This was reinforced through the ID student feedback that clearly articulated connections between understanding the experiences afforded through built

environment and children's learning outcomes. Faculty were confident that the process would be educational for the ID students, but the comments expressed by those students who participated in the follow up interviews revealed the depth of the impact.

A Revitalized Sense of Place

Another outcome of the process was more unexpected. Studies on educational settings have shown that the overall morale of all users including teachers, parents, students, and administrators can be raised by addressing the overall quality of the educational spaces (Chan & Richardson, 2005). One of the most significant outcomes of this case's process was that simply generating ideas about the possibilities for improvement appeared to have a similar positive effect for a wide range of stakeholders. Follow up interviews with the teachers and administrators revealed a renewed enthusiasm for the potential within their existing building. They commented that it was exciting to have a different audience provide fresh perspectives and acknowledged that they had become somewhat complacent with the current state of their facility.

Being listened to by the students was empowering, and one teacher compared it to going through a Christmas wish book. One of the teachers reflected,

It's nice to have a vision...it's hard for us on the inside; we're here all of the time to have a fresh perspective to see what it can be.

Another teacher noted that the revelation of the possibilities of what could change was extremely inspiring:

I never imagined that something like this could be changed, and now there's the possibility. Your students showed us that. They gave us some good ideas, and we have a direction to go.

Staff also noted that the design solutions reinforced the attributes that were significant to their identity, including a historic context as a foundation of their current successes, as well as a clear attention to their Catholic identity, which was reflected in the symbolism of many of the design details.

Respondents also commented that the design solutions for the entrance addressed their need for security without a sense of confinement or oppressive enclosure (Figure 16).

One teacher noted,

This building isn't just a place of learning, it's a gathering space and a space of community. The rest of us in the building will still do the lesson and still do the things we do today, but how it's perceived and how it looks can be made safer and a better place for all the people around it.

And another commented,

Community and family is the central theme here...many designs had a gathering space as you walked in the door or the outside area, where people could congregated together...it had a family feel to it. I think that an important part of our school.

After the final presentation, the design projects were put on display during an open house where parents and other board members could share in the feedback. The principal noted the impact of sharing the project with these constituents,

Seeing the excitement of the staff, of the parent, of the leaders of the school; and when I see their excitement I know the vision can be realized for the benefit of the community. I learned that there is that support from all stakeholders in the community to move forward.

Resulting Perceptions on the Value of Interior Design Services

Being able to demonstrate the power and impact of interior design on the classroom and learning experience was very exciting for the students—especially senior students who

intended to enter the profession at the project's completion—an outcome that was hoped for by the faculty members. Speaking of the client's reaction, one student stated:

they got our perspective on what we were actually doing when they might not have been familiar beforehand what an interior designer actually does and how much we can influence the space and help people out.

Another student noted:

For me it was really cool to see them understand what we do, it's awesome, and it's a great feeling. Because they know now how important this desk is, making it so much bigger or making sure that the seating is comfortable for the students in the learning environment, and I think they can understand that now.

Four staff from the Manhattan Catholic School participated in a post-project interview to discuss their observations and the major outcomes from the student team solutions. The staff noted that they were quite surprised at the level of detail that the students attended to. Their initial expectations were that the interior design students might suggest some minor changes in finishes such as flooring materials or address colors for the rooms. Having never worked with interior designers before, they were surprised to see the amount of detail that the students were able to address as part of the interior considerations. One of the teachers noted:

I expected carpet and desks, and maybe a little paint, maybe change the curtains and maybe tweak windows. But what they did was far beyond the scope of anything that I thought was possible.

The principal also stated:

I was blown away. I've not dealt a lot with interior designers...it's not what I do. As an educator, you come to school, you teach the students, protect them, and send them home. We know that we have an older building that we needed to update. The scope of what was given to us was just truly amazing.

SIGNIFICANCE OF THE PROJECT

Early childhood is a very important stage in human development. What is learned and experienced in the formative years has been shown to have a strong impact on shaping how children move into adulthood. Advances in design strategies for place-types such as educational settings can be influenced by returning to the fundamentals of what it is like to learn something for the first time. Every interaction that a child makes with their environment is a learning experience; one that adults may take for granted. This design case has detailed one experience of teaching interior design students how to understand the role of the built environment in supporting the educational process and overall learning experience. From the beginning stages of articulating the

programmatic requirements through applying evidence based design strategies in proposing appropriate solutions, this multi-stage process allowed students to experience first-hand the potential steps involved in working with a client. These students were able to guide the project outcomes from the beginning of the project because they were able to help define the problems that needed to be addressed for the various user groups. Each stage of the project provided students with new skills and understanding of the problem-seeking and design process.

The significance of this design case lies also in what was learned about the expectations of grade school educators who were providing a reputable curricular program but who had come to cope with a less than supportive educational setting. The grade school teachers initially expressed skepticism about the impact interior design solutions could have on the outcomes of delivery of their curriculum. During the course of the project, however, as the interior design students interacted with multiple user groups of the grade school setting, a revitalized sense of place was established. Teachers began to specifically articulate the significance of the quality of the perceptual environment on learning. Likewise for the interior design students, they were able to apply theories of child development as well as evidence-based design strategies that culminated in design decisions with real and rewarding impact.

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