Bridging The Gap Between School And Community:

A project based high school for contemporary education

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University of Hawai‘i at Manoa
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Doctorate Project Committee
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We certify that we have read this Doctorate Project and that, in our opinion, it is satisfactory in scope and quality in fulfillment as a Doctorate Project for the degree of Doctor of Architecture in the School of Architecture, University of Hawai'i at Mānoa.

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ABSTRACT

This thesis presents a design exploration into educational facility design, in particular to high schools, and the implications of educational pedagogy on high school design. The thesis poses the question, how can architectural design bridge the gap between schools and community, raising the value of education for students, parents, advisors, and community? A literature review and case study analyses examines both the existing paradigm of traditional school models and the alternative paradigm of the project based model. This thesis focuses on the project based learning model as it relates to design, significantly the three relationships: student to student, student to advisor, and school to community through their influence on design.

BRIDGING THE GAP BETWEEN SCHOOL AND COMMUNITY:

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I. Project Statement

Continuing decline in student scores, attendance, and graduation rates within public schools has left the public education system in shambles. "Three of every 10 learners who enroll in high school every year will not complete their studies in the normal 4-year span, with minority students falling behind at even higher rates."[1] As a result, this thesis rejects the traditional educational model in favor of a contemporary model, project based learning. The traditional industrial model, the primary model for today's schools, has been unable to prepare students for the contemporary business world. The traditional lecture based method of teaching is a passive approach to learning and relies on students absorbing information strictly through listening. Lecture based instruction is a "teacher centered" system with "an emphasis on efficient teaching processes."[2] Teacher centered refers to the conventional method of education where knowledge is transmitted from professor to students via lectures. This paradigm rests in the obsolete teaching philosophy and outdated learning environment. Within the past few decades there have been many attempts to overhaul the very traditional public educational system, especially high schools. High schools are unique because they provide a multitude of different functions including fitness center, music auditorium, cafeteria, lecture hall, etc. The diverse program is important because it introduces students to a wide variety of interests and career fields. In the search for a new educational model and to reform the public school system, educators and educational facility designers have been developing new learning environments and philosophies, moving beyond the traditional teacher centered model.

1Bill and Melinda Gates Foundation. " U.S. high schools: The challenge." Bill and Melinda Gates Foundation. 2008. http://www.gatesfoundation.org/

2 Kelly, Frank S., Ted McCain, and Ian Jukes. Teaching the Digital Generation: No More Cookie-Cutter High Schools. Los Angeles, CA: Corwin Press, 2009, 89.

Consequently, non-traditional education models take a student centered approach based on personalization and in-depth, applied skill activities. This new approach to education makes the design of a new educational environment paramount. Project-based learning is a strategy of education that has been gaining wide acceptance in the public education system. A strategy or philosophy in educational practices is commonly referred as school *pedagogy*. By Webster's definition pedagogy is defined as the art of teaching.[3] Based on this definition school educational pedagogy establishes the framework in which a school operates, from the instruction method to the design of the facility. Project-based learning entails a specific pedagogy which relies on a student centered philosophy. Consequently, students are expected to take an active role in their education and engage in in-depth, interdisciplinary projects. However, these projects move far beyond the conventional book report or science lab exercise. Project-based learning is typically designed to have an interdisciplinary approach where students involve many fields of study. Furthermore, project-based learning permits a kind of flexibility that allows projects to evolve organically rather than on a strict structured path like in the traditional philosophy. By designing learning spaces conducive to the unique project based learning pedagogy, education can be a more enjoyable and successful experience.

The interdisciplinary approach requires a communal atmosphere that allows student and teacher to engage one another on a more personal level, i.e. *small learning communities*. The basic idea of a *small learning community* "is to create small groupings where everyone knows everyone else."[4] The philosophical parallel within *project-based learning* and *small learning communities* makes the two an ideal union. With surmounting pressures on students to develop career and college ready skills, students have to develop skills that are possible only through tight-knit relationships, hands on activities,

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3Merriam-Webster, Incorporated. Merriam-Webster's Online Dictionary. 2009. http://www.merriam-webster.com/dictionary/pedagogy.

4Fielding, Randall and Nair, Prakash. The Language of School Design: Design Patterns for 21st Century Schools. Minneapolis, MN: DesignShare.com, 2005. 24

and in-depth projects. Thus, learning studios must be designed to allow students to engage each other, teachers, professionals, and the community at large. In small learning communities it is not enough to place students in desks, the spaces must conform to the unique activities that occur within them.

This thesis will investigate how project-based learning and small learning communities can be unified under one inclusive high school design. Furthermore, this thesis will explore how this union can be achieved within a context that is prone to many more challenges-the inner city.[5] Many high school studies have strayed away from the inner city and rather focused on suburban or rural contexts. This thesis attempts to break away from past studies on educational paradigms. The inner city offers a unique and complex set of challenges: availability of land, safety/security, perception of education, and distinct cultures. These challenges as well as other negative misconceptions have forced many to view the inner city as an unsuitable environment. However, this thesis explores the many favorable and unique qualities that an inner city has to offer. Past studies and investigations into educational design and philosophies have been constrained to suburban and rural contexts. Like most building typologies the open context within suburban/rural areas offers designers and educators a freedom to create unique and high performing schools. While there are many issues regarding suburban sprawl and rising concerns in the utilization of urban locations, in recent years there has been an increase of younger families moving back to urban neighborhoods within the inner city. In addition, inner cities are inherently dense and locating a high school within the inner city allows a school to utilize existing resources, at the same time the school can provide a new resource to the community. Therefore is essential to create suitable high schools within urban areas.

5Inner Cities are defined as core urban areas that currently have higher unemployment and poverty rates and lower median income levels than the surrounding Metropolitan Statistical Area (MSA). Inner cities have 20% poverty rate or higher, or two of the following three criteria: poverty rate of 1.5 times or more that of their MSAs, median household income of 1/2 or less that of their MSAs, unemployment rate of 1.5 or more that of their MSAs. (Alston)

Community involvement indirectly and directly affects the value of education within a community, especially within an inner city. The relationships of students, faculty, parents, and business professionals are essential to any community culture. As schools are traditionally the primary institution where all these people come together, the school should foster an environment that cultivates these relationships. A project-based pedagogy is successful only if there is community involvement, without this involvement students lack a fundamental component of their educational experience. The design must allow the community to interact with students and teachers, which is possible by creating a more welcoming and accessible facility.

The union of project-based learning and small learning communities offers the opportunity to design a model high school built upon a prescriptive set of functional needs. An inner city location adds another level of complexity to the pedagogical structure where the school must insert itself into a mature context with existing resources. However, the existing context can be used as a mechanism for building relationships. Thus, introducing a functional component that allows the public to utilize facilities beyond the typical school use is important. How can a high school serve public needs and student needs without disrupting the educational agenda?

Project-based pedagogies are becoming more and more common within public education systems across the nation, but there are very few that are housed within facilities conducive to such a unique education philosophy. Shrinking educational budgets and reluctance to change has forced public high schools across the country, that choose to adopt project based learning, to utilize existing traditional school facilities. Thus, educators and students are not able to function properly and schools are not operating at the level they should. This thesis will explore how architectural design can manifest the philosophies of project based learning and the ideals of small learning communities within an inner city in physical form.

II. BACKGROUND/FIELD OF STUDY

A. TRADITION

Public education is the keystone of modern American society, but has come under fire in recent decades due to declining student success. Much of this decline has been attributed to the conventional practices of traditional education. The traditional high school or industrial model works on a block schedule, where students operate on a 50-60 minute time period, shifting from classroom to classroom, thereby effectively servicing as many students as possible within in one facility. This traditional model is manifested in physical form by the commonly known comprehensive high school. The industrial model is, as its name implies, a school built on efficiency, process, and repetition.

Comprehensive high schools are large structures containing a large student body with over 2,000 students. The comprehensive school is organized spatially and instructionally around academic departments: Math, English, Science, Social Studies, and Foreign Languages. Most high schools are "self contained" with all instruction, specialty resources, and sports on a large site.[6] Kelly, McCain and Jukes state, "the Industrial Age school is an exceptionally large and complex facility-more like a small town than a building."[7] The internal network of spaces is organized by classrooms, with up to 30 students, which straddle a double loaded corridor containing lockers. Specialty spaces

6 Kelly, McCain, and Jukes. 89
7 Kelly, McCain, and Jukes. 89

like the library, cafeteria, computer lab, theater, etc. are isolated spaces that rely on the dark cramped corridors for circulation. Teachers are primarily allocated to one classroom while students change rooms every hour to accommodate all students. Students do not have any personal space besides their locker.

The traditional classroom, what Fielding and Nair call the "Cells-and Bells (Ford) Model" is outdated. It was developed during the time of the Industrial Revolution, a time of efficiency and the assembly line. The "Cells-and-Bells Model" was meant to serve as many students as possible in an orderly and timely fashion, which meant students would utilize one classroom at a time (the Cell) and proceed to the next classroom once notified (the Bell). The entire school system is outdated; the three month summer break that the American public is so familiar with is based on the agricultural cycle where students were expected to attend to crops.[8]

B. LARGE VS. SMALL

Unlike the comprehensive high school, the small school has a wide range of styles, but there is a typical system. These schools are organized spatially and instructionally around academic houses of approximately 150 students. Academic houses are isolated from each other to establish smaller communities. Within those 150 students there are 10-11 advisories of 15 students. Typically there is a low student to teacher ratio.[9] In the advisory, students are given individual workstations to accommodate various types of personal activity. There is a diverse mixture of spaces allowing for different types of activity. The common space is the core of the small school and is where various activities occur. Spaces and instructional time are kept flexible so as to accommodate for changes in instruction and much of the day is self-directed learning. Extracurricular sports are typically not offered, but schools do make arrangements for students to join other

8 Kelly, McCain, and Jukes, 10
9 Kelly, McCain, and Jukes, 130

schools' after school activities. Small schools are meant to be academic focused and therefore sports are not a priority. The small student body makes them ideal to network within the community so that students can partake in real work experience and internships. Most small schools do not have a large administrative body; therefore, advisors take on a large responsibility. The small school or academic focused school is a very different type of high school where there is a distinct focus on the student culture and school community.

Extensive arguments have been waged over whether large comprehensive schools or small schools foster a better opportunity for students to learn. Small student community environments developed out of not only the strong push for something/anything new, but also from data driven reform; the primary model being the *Breaking Ranks Model*. The comprehensive model was the tried and true method because it could serve several thousands of students efficiently and concurrently offering a wide range of extra-curricular facilities. Initially the main argument for large schools was that they were more cost effective, based off the Business model of Economies of Scale. The economies of scale in schools were primarily associated with the idea that larger schools have a lower per student cost than small schools thus making them more effective.[10]

On the other hand, research completed by W.F. Fox during the 1980s argues that, "as long as increasing school size results in larger pupil/teacher ratios, per pupil expenditure will drop. Once maximum class size is reached, however, no additional savings are possible, but continued increases in school size will continue to increase administrative costs."[11] However the research also argued that, "When school size is considered in isolation, schools between 500 and 1,000 students are probably operating at peak economic efficiency."[12] This suggests that size plays a minimal role in the cost effectiveness of a

10 Jones, John R. and Craig H. Slate. Effects of School Size: A Review of the Literature with Recommendations. Essays in Education, Department of Education at the University Of South Carolina Aiken, 2005. 3
11 Jones and Slate. 3
12 Jones and Slate. 4

school; therefore, school size should not be the predominant component to design decisions. Recently studies calculating effectiveness of schools have been based on the "actual academic achievement of students" rather than the cost.[13]

The Breaking Ranks Model was an effort funded by the U.S. Department of Education's Office of Educational Research and Improvement. This report focused on data for the decision making process through the provision of substantiated evidence regarding the success or failure of programs and instructional practices. [14]The data collected includes: ***demographic data-*** gender, ethnicity, economic status, disability, language proficiency, aspirations and attitudes, ***student education data***- current school, grade level, years in district, prior education programs courses, levels, learning community levels, and ***student performance data***- attendance, discipline, diagnostic assessments, classroom assessments/grades, proficiency assessments, state assessments results, standardized test results, dropout rates, and graduation rates.[15] The type of data displays the spectrum of characteristics and criteria in which students and programs are being evaluated on. The integration of the data seems to create a holistic evaluation of high schools which is needed when specific groups/types of students are being evaluated. What is particularly significant from this study is the strong association between academic achievement and social class.

In an earlier study, K. Cotton found the "benefits of small school size were greatest for students from the lower social classes."[16] Beyond the study of small school size, there have been studies in regard to smaller class sizes. During the Student Achievement Guarantee in Education (SAGE) program, which took place in Wisconsin in 1996,

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13 Jones and Slate. 5
14 Lachat, Mary Ann. Data-Driven High School Reform: The Breaking Ranks Model. U.S. Department of Education's Office of Educational Research and Improvement. Providence, Rhode Island 2001. 5
15 Lachat. 27
16 Jones and Slate. 7

thirty schools of similar demographics were compared based on class size.[17] Fifteen of the thirty schools were made up of twelve to fifteen students while the other fifteen schools ranged from twenty-one to twenty-five students. The students within the smaller class sizes gain in test scores with the greatest gains coming from the African-American students. In a similar program in Tennessee called Student/Teacher Achievement Ratio (STAR) similar results were found. In both cases minority students increased their test scores more than white students.[18] Research continues to back up initiatives to build small school environments and architects have responded to the movement of small learning communities.

C. PROJECT BASED LEARNING

Project based learning on a basic level is a type of instructional method which "is synonymous with learning in depth."[19] The in-depth process of learning stems from the thinking of the famous philosopher John Dewey, in his introduction of inquiry-based learning. Dewey's postulates and theories in social behavior and knowledge are extensive, as a result this thesis draws only on his basic theories to explain the derivative of project based learning. Dewey was "in favor of a naturalistic approach that viewed knowledge as arising from an active adaptation of the human organism to its environment."[20] This view comes from the belief that human beings cannot learn passively, rather they must engage in testing hypothesis and adapt knowledge. Much of Dewey's theory of knowledge came from his analysis of Darwinism, which understood the progression of all species as an evolutionary process where species are "a product of a

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17 Schneider, Mark. "Do School Facilities Affect Academic Outcomes?" National Clearing house for Educational Facilities, November 2002. 15
18 Schneider. 16
19 The Buck Institute for Education and Boise State University, Department of Educational Technology. "What is Project Based Learning?" Project Based Learning-The Online Resource for PBL. http://www.pbl-online.org/
20 Fielding, Richard. "John Dewey." Internet Encyclopedia of Philosophy (IEP). July 4, 2005. http://www.iep.utm.edu/dewey/.

natural, temporal process of adaptation of lineages of organisms to their environments."[21] Thus, learning is a naturalistic progression that entails a complex interrelationship between students and their environment. Dewey labeled this natural learning process as instrumentalism, which involves the application of knowledge where the significance of such knowledge comes from its usefulness.

Dewey detailed his theories in inquiry-based learning in his four essays in "Studies in Logical Theory." In his analysis he explains that there are three phases to inquiry processes: 1) the problematic situation, 2) the isolation of data or subject matter, and 3) reflection.[22] The problematic situation is the situation in which "instinctive or habitual responses of the human organism to the environment are inadequate for the continuation of ongoing activity in pursuit of the fulfillment of needs and desires."[23] The isolation of data refers to the human mechanism of defining parameters to reconstruct the problem in a solvable manner. Reflection is the process of understanding the answer through the cognitive elements of inquiry, ideas, suppositions, and theories.[24] However, Dewey adds a fourth phase asserting that the application and employment of lessons learned is the final test of understanding. Consequently conventional teacher centered education is an inadequate method for provoking all phases of learning. Instead, lecture based teaching methods introduce ideas through separate and distinct subject matter, which students must reconcile on their own.

In addition, Dewey rejected the consensus of traditional social theories which upheld that humans are grounded in self-interest or individualism. Rather, Dewey contended "that the human individual is a social being from the start, and that individual satisfaction and achievement can be realized only within the context of social habits and

21 Fielding
22 Fielding
23 Fielding
24 Fielding

institutions that improve it."[25] Accordingly, learning is achieved through an organic, in-depth, and social process, which is the foundation of project-based learning.

Project-based learning involves all the values central to Dewey's theory of knowledge where learning is a holistic process of inquiry, reflection, application and socialization. However, most project-based models break away slightly from Dewey's theory by emphasizing personalization. Personalization involves playing to student interests and allowing students to select areas of specialization. On the other hand, this does not imply that projects are geared to student's strong points, rather the field of interest is a starting point. Due to the interdisciplinary approach to the learning process, students are exposed to a diverse network of fields, thus engaging student's strong and weaker skill sets and abilities.

D. THE ADVISOR

For project-based learning to be successful, advisors need to develop a project plan and coordinate with one another in groups. Depending on the school the initial project plan may or may not include students at the beginning. A typical project plan illustrates the planning process and the basics of a student project. For example, first, advisors begin by selecting a broad/general theme that serves as the foundation for a semester project. The theme topic may be one of the schools specialty areas or it may come out of student interests. Subsequently, advisors examine what students will learn from the topic. The question is whether or not the students should learn about the theme in a general sense or should they learn about a specific part of the theme. This depends on the advisor's preference of learning downward or upward. In other words, a general theme can inform students on broad level thus allowing students to reflect on the importance of the theme in a more detailed sense, or a specific part can be used to educate students on the applicability of the broader theme and students reflect on the importance of the theme.

25 Fielding

E. SMALL LEARNING COMMUNITIES

The trend of today is focused on putting together smaller groups of students thereby creating an atmosphere of comfort, learning, and discussion. These new types of schools are commonly referred to as: Community Learning Centers (CLC), Small Learning Communities (SLC), and School within Schools (SWS), three forms of the new typology. Each of these new school typologies comes out of a new pedagogy of teaching and each alternative is a look at different methods of constructing a high school. This section reviews the research completed in regard to school size, class size, and alternative educational approaches. Although the thesis does not aim to establish that school or class size is determinate of student achievement, it is important to evaluate which is most appropriate to the specific context of this project.

The new classroom must be able to provide for a range of different activities; therefore, the rectangular space is no longer suitable because it limits the use of the space. The L-shaped classroom or "Learning Studio" is perceived as a space with the ability to support three separate spaces: the Flex space, active zone, and breakout area.[26] The Flex space is the main space where students give presentations, work individually or together. The Active zone is meant to support a more project based function, with large work tables. The Breakout Area is the more casual space where students can conduct small group discussions. Furthermore, classrooms can be combined by utilizing moveable partitions to create "Learning Suites."[27] Moveable walls allow teachers to conduct larger group activities or give presentations which give advisors the opportunity to work together. The Small Learning Community (SLC) Model utilizes the Learning Studio to create a larger network of learning spaces. In an SLC, several learning studios are clustered together with small advisor work rooms and a central, large multi-purpose space. SLCs are meant to promote small student communities within a larger grouping where students

26 Fielding and Nair, 20
27 Fielding and Nair, 20

can start to take ownership/pride in particular area.

Another alternative to the traditional classroom is the Advisory Model, which is a spin on the plan model. The advisory model is more like an office atmosphere, where students get personal workstations and get clustered into small groups, like cubicles. Dispersed within the clusters of cubicles are small multi-purpose areas and advisors desks. The advisory model seems to be a system that supports a project based education, but also offers the opportunity for lecture at any given time. Each of the classroom models, besides the traditional model, is an attempt to expand the idea of the "classroom." In the search for the best antidote to learning and teaching, Fielding and Nair have prescribed 18 Learning Modalities that explain the diversity of functions that architects must design for:

1) Independent Study
2) Peer Tutoring
3) Team collaborative work in small/ mid-size groups
4) One-on-One learning w/ the teacher
5) Lecture format with the teacher at center stage
6) Project-based Learning
7) Technology-based learning with mobile computers
8) Distance Learning
9) Research via the internet with wireless networking
10) Student presentations
11) Performance and music-based learning
12) Seminar-style instruction
13) Community service learning
14) Naturalist learning
15) Social/emotional learning
16) Art-based learning
17) Storytelling (floor seating)
18) Learning by building-hands on learning [28]

The primary thought behind the 18 modalities is that students are expected to have a diverse mixture of skills, whether it is public speaking or computer literacy; therefore, schools must supply the necessary tools. The spaces we create are vital to the learning process because the environment effects perception and mood. Therefore, when designing educational environments it is important to understand human learning processes, the foundation of our ability to process information.

F. LEARNING PROCESSES

The lecture based learning model is the conventional method of teaching, by

28 Fielding and Nair,, 20.

means of professors presenting information and students restating the information. Research shows that although the brain relies on this formal process of repetition in basic factual knowledge, the mind also requires stimulus in other forms to support reflective learning. Reflective learning allows students to not only retain information on a shallow level, but also gives students the ability to use information in other ways.

Daniel Willingham, a cognitive psychologist, has focused his research on discovering the cognitive learning processes and Howard Gardner's work has been in multiple intelligences theory. Willingham's research primarily explains the method in which people learn, by people's ability to utilize their long term memory in conjunction with their working memory to problem solve. Long term memory is dependent upon experience and active repetition. Cognitive research is significant to this thesis because it explains the basic ways students operate and what is achievable within the classroom. Willingham has found that changing the pace or shifting gears will help teachers engage students.[29] It is essential that classrooms and schools as a whole offer students diverse methods of learning and interacting. In addition, he explains that lecturing or demonstrations are helpful but for that information to become part of long term memory, people need to learn by doing, repeatedly. He explains that lab-exercises and in-class projects have "the potential to be an experience that will puzzle students momentarily, and then lead to the pleasure of problem solving."[30] This implies that students have a better experience if they engage the topic, making workspace within close proximity, all the more important. Workspace as well as other types of spaces help build human's multiple intelligences as a whole.

Multiple intelligence theory is based on the idea that all humans have eight intelligences: linguistic, logical/mathematical, musical, bodily, kinesthetic, spatial, naturalist,

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29 Willingham, Daniel T. *Why Don't Students Like School: A cognitive scientist answers questions about how the ming works and what it means for the classroom.* San Fancisco, CA: John Wiley and Sons, Inc., 2009, 17.
30 Willingham, 16.

interpersonal, and intrapersonal.[31] Gardner believes that all intelligences should be provoked within the educational setting, so as to strengthen all of them.[32] Fielding and Nair are utilizing these premises to design their schools and have tried to employ as many intelligences as possible within single spaces. "A balanced program will allow students to fully sharpen the 'favored' intelligences, as well as encourage exploration of the world utilizing their other intelligences."[33] Others have argued that some intelligences are more important than others; however, Gardner believes that all are important to human development.

G. DIGITAL LEARNERS

Research now shows that humans have now acclimatized themselves to digital technologies, creating a digital intelligence. The overwhelming amount of digital information that high school students expose themselves to have reorganized the way the brain processes the input of information; this is called neuroplasticity. Kelly and Jukes explain "the brain encounters a new kind of input for sustained periods of time on a daily basis for an extended period of time, it will reorganize neural pathways to handle the new input more effectively."[34] These students are called "digital learners." Digital learners prefer

31Gardner, Howard. Intelligence Reframed: Multiple Intelligences for the 21st Century. New York: Basic Books, 1999. 16
32 Gardner. 17
33 Fielding and Nair, 71
34 Kelly, McCain, and Jukes, 23

diversity in media and have the ability to multitask different types of information. Furthermore, research shows that the brain can process visual information 60,000 times more quickly than textual information.[35] The digital age has made students faster thinkers and better decision makes due to things like cell phones, the internet, and even the television. For this reason Kelly, McCain, and Jukes explain several ways education can be tailored to digital learners. First, instruction needs to change from the traditional lecture to discovery based learning, hands on system. Second, teachers can utilize the different types of media like video, sound, or photos. Third, schools should give access to the web any place and anytime. Finally, students ought to network with professionals, other students, and experts.[36] Digital learners are the students of the 21st Century and high schools have to be ready to teach them.

H. JUSTIFICATION FOR PROJECT BASED LEARNING

The age of traditional teaching and learning methods is quickly coming to a close as the age of technology and media based fields are rising. The core curricular fields-math, social studies, english and science-typical in every school are still pertinent to high school education. However, as most high school students would agree, these core studies do little to prepare students for their careers. Pedagogies based in project-based learning have begun to institute educational frameworks that prepare students on an interdisciplinary level for the professions of the 21st Century. Project-based learning coordinates several disciplines, allowing students utilize their skills in reality based projects. Small learning communities seem to work in tangent with project-based learning pedagogy principles, setting up an environment suitable for such activities. Yet there are still several supplementary issues that impact high school design: culture and community, safety/security, daily operations, and student perspectives.

35 Kelly, McCain, and Jukes, 23
36 Kelly, McCain, and Jukes, 24

III. SUPPLEMENTARY ISSUES

Inner city educational facilities deal with an array of cultural, societal, and political issues. Culture and community, safety, school planning/longevity and the student perspective are four major themes involved in the design of inner city schools. In addition, high school organization, function and program are fundamental to creating a contemporary design. The four themes are used as a means to articulate their importance to creating a successful school design. The present body of knowledge explains in various ways how these factors can lead to the success or failure of educational environments. Cities like New York and Chicago have recently attempted to address these four major themes.

A. CULTURE & COMMUNITY

1. NEW SCHOOLS FOR NEW YORK

Culture and community involve the consideration of city scale and community demographic, which have a strong influence on the school environment. The Architectural League evaluated the New York school system in a collaborative effort with the (PEA) Public Education Society to find better school designs. The project is called *New Schools for New York* and it describes a previous attempt to improve the educational environment and its overall structure. In specific, the New York project boasted the potential of supporting school and community culture through small schools. In this particular New York study, smaller schools were designed in conceptual form to show how small scale school design can potentially be as cost effective as large schools, but with a larger social and cultural benefit. *New Schools for New York* attempted to show the benefits of small schools by developing designs on six different sites in four boroughs. However, most of the designs were focused on the adaptive reuse of existing buildings. Multiple architecture firms proposed different design schemes for each site, offering various innovative design solutions to create supportive and communal environments.

The Sunset Park school program in Brooklyn designed by Caliandro Associates II, was one of the schemes which explored a new type of small school design. The Sunset Park School design team found that the best way to foster community culture was through an innovative school program. The architects involved, incorporated a green house center and connected the school to the public library, which sat on the same city block. In addition to new facility functions, the architects in all of the small school designs incorporated multi-purpose rooms, display galleries, and small outdoor public spaces. "Block" organization in Sunset Park was the layout tool used to construct a public and interactive environment. The galleries and block organization were a response to the Hispanic population, because it was found that the neighborhood demographic would often partake in community events. In an attempt to respond to the unique culture of the community, the plaza areas were created for more traditional Hispanic cultural activities.[37] The addition of new school functions and a more public program were used to create an educational facility as an urban catalyst.

2. CHICAGO PUBLIC SCHOOL REFORM

The Mayors Institute on City Design describes how the Chicago Public School system has taken a similar route as New York. Similar to the *New Schools for New York Project*, The Mayors Institute proposed several school design concepts that have the potential to build a stronger community and school culture. Each educational facility design describes a school with community involvement and cultural awareness. Reiterating the sentiments of the Architectural League, Sharon Haar explains, "the typical perception of the need for large plots of land, huge amounts of money, and small school sizes hinder the progression of school design."[38] However, in contrast to the view of the Architectural League, Haar believes that retrofitting existing buildings is not the best option for new

37 The Architectural League. 1992. *New schools for New York: Plans and precedents for small schools.* New York: Princeton Architectural Press, 100
38 Harr, Sharon. 2002. *Schools for cities: Urban strategies.* New York: Princeton Architectural Press, 35

schools. In Haar's view, the difficulty in renovating is that previous school planning did not consider long term or sustainability, which produced disconnect from the community.[39] Accordingly, this thesis stands on the belief that community and culture are what make inner cities so interesting and educational facilities should help enhance the feeling of community. The Chicago school reform project and the Architectural League's New York schools proposal reaffirm that community and cultural consciousness have been forgotten within public schools. On the other hand, if such themes are considered from the onset, schools can be designed to foster community culture.

3. IMPLICATIONS ON SCHOOL CULTURE

The culture of a community is often an invisible system, hidden in the everyday relationships of people and their environment. For that reason, culture is often taken for granted and left as an inherent component of design. However, the intangible nature of culture impacts the internal culture of schools. Deal and Peterson illustrate the importance of school culture by examining schools with a strong sense of school culture. Deal and Peterson investigated inner school culture to describe how strategies can be employed in educational facilities to support a richer social environment. Deal and Peterson illustrate how these intangibles within the school environment have clear implications on the architectural form, and vice verse.[40]

The authors paint a picture of school culture with the case study of Granado Primary school in Arizona. The rich Navajo culture was incorporated into the architectural design. Physical depictions of the culture are evident in the traditional symbolic paintings in the school, but there are also underlying themes. For example, unlike most schools where a majority of the time the library takes a secondary place to the athletic facilities, Granado makes the library the main focus. The architectural display of the

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39 Harr. 3

40 Deal, Terrence E. and Kent D. Peterson. 1999. *Shaping school culture.* San Francisco: Jossey-Bass, Inc, 3.

library as the focal point conveys the importance of creating a school focused on the education of its students. The main gathering space shaped as a Hogan, an ancient and specially shaped Navajo home, describes the significance of community culture.[41] More often than not, schools internalize the most significant spaces. By internalizing such spaces, schools conceal the culture of the school.

The Granado Primary School is an example of how traditional methods can be implemented into the design to promote a more community based culture. The specificity of the design to the community culture shows that educational facilities can be more successful when cultural sensitivity is promoted. People, location, politics, and culture are all a part of creating an educational environment. Deal and Peterson show how these issues translate into the architectural form. Schools are more than a place of business or teaching, they are places of culture, and architecture can be a tool for helping the entire school body experience their culture.

B. SAFETY

Safety is a continually rising social issue concerning schools and inner cities. Educational systems have reacted to these issues by creating educational prisons. Schools have closed their doors to the community and installed security cameras to restore safety. Security guards and cameras attempt to stop school violence, vandalism, and theft, but these methods seem to have had an adverse effect on education. Students have become disenchanted with their school environments because of these overly coercive security measures. In addition to the daily school violence, the growing threat of terrorism has left many schools implementing even more prison-like methods.

Philpott and Kuenstle illustrate in drawings, diagrams, and descriptions what security measures should be taken to protect all of the student body by an assortment of

41 Deal and Peterson, 16.

methods. Their handbook demonstrates passive and active ways to combat both vandalism on the day to day level and the more serious danger of terrorism. Inner city schools are plagued with the same problems as their neighborhoods of gangs, graffiti, and harassment. Simple adjustments in orientation, position, and overall layout can ensure that safety is retained. Public surveillance is repeated over and over within the facility design section in an effort to explain the link between public views and violence.

Philpott and Kuenstle explain, that faculty and administration should be placed at the main entrance and glazing should be introduced in an effort to deter trespassers by the means of natural surveillance.[42] Covered walkways are also helpful at these entry points because they offer shelter from rain and give the entrance prominence, but if designed wrong they can cause other problems. Canopies or covered walkways can allow trespassers unwanted access to the roof if designed incorrectly. Protecting ventilation and mechanical equipment has become of greater concern in recent years due to terrorism. To make sure air supply and mechanical systems cannot be tampered with, air intake should be located as high as possible and kept in a closed and secure location.[43] Good architecture practice should always include many of these safety issues in all designs, but even more necessary when designing educational facilities because of its occupants. In addition, niches and isolated areas should be avoided at all costs to provide a safe environment in all conditions.

The standard school system of students changing rooms every hour for classes puts a large group of students in circulation areas posing many design problems. Philpott and Kuenstle stress the importance of circulation design, because the majority of school violence occurs in hallways.[44] Standards for class systems are unavoidable, but natural surveillance and well lit areas can promote a feeling of safety. There is a need to incor-

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42 Philpott, Don and Michael W. Kuenstle. 2007. *Education facility security handbook.* Lanham: Government Institutes, 86.
43 Philpott and Kuenstle, 130.
44 Philpott and Kuenstle, 95.

porate the use of surveillance cameras and gates in some instances within the facility layout, but by using the school body itself as a natural surveillance tool there is less of a need for technological security tools. School safety procedures that educational facilities must follow during times of emergency must also be dealt with early in the design phase to ensure that students and faculty can exit in a safe and timely fashion. Safe and secure schools in the inner city are most difficult because often the context which the school resides in is prone to violence. Philpott and Kuenstle offer solutions which potentially, not only create a safe school environment, but also create a catalyst for community safety by using natural surveillance. Involving the community in as many ways as possible gives a better possibility for a successful facility.

C. SCHOOL PLANNING/LONGEVITY

Preliminary planning and management must be efficient to guarantee that a school can function on all levels throughout daily operation. The long term planning of schools in terms of economics, sustainability, and educational politics involve the broad scope of a master plan. Castaldi gives a candid overview of the initial planning methods and the need to construct efficient contemporary educational facilities. Urban planning methods will help in determining where the best location for the development of a secondary school should occur. The long range planning, which Castaldi explains, is the best way to ensure a successful design. Flexibility and economic stability within the long-range development of an educational facility are the driving factors in its success, because like all things schools change over time.[45]

Planning for sufficient instructional space is vital to the future growth of a school. Many times schools cannot offer enough space for students and faculty because the future development of the area was not taken into account. The planning of the school capacity

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45 Castaldi, Basil. 1994. *Educational facilities: Planning, modernization, and management.* 4th ed. Needham Heights: Allyn and Bacon, 71.

itself and its thresholds can aid in developing an educational facility that can evolve along with its context. Castaldi explains that "educational planners found that the size of a classroom can vary from school district depending on the nature of the instructional system."[46] The Conrad technique is an approach used to calculate what the operating capacity of a secondary school should be, based on the idea that the facility should fit the program rather than determine it.[47]

In addition to planning, Castaldi offers a diagrammatic representation on the architectural layout of the school functions. Although the school architectural organization and layout is what is in question for this thesis, Castaldi's perspective will help determine what arrangements are most effective. Castaldi offers a broad range of information but the straightforward and detailed perspectives of the educational environments are the most pertinent.

Like Castaldi, Tanner and Lackney cover a wide range of educational facility topics from architectural planning of schools to the management of maintenance operations. In these topics they describe basic planning principles for the school design process. Within these principles, there is clear focus on community involvement and creating social and cultural understanding. Tanner and Lackney explain similar planning principles to Castaldi, but their planning principles are more rooted in community and cultural awareness. Fourteen case studies of educational facilities describe different typologies of schools which were successful for various reasons. Tanner and Lackney explain that these schools all have in common a predetermined set of community values, a purposeful physical learning environment, a direct response to the context, realistic goals, and a forecasted student enrollment.[48]

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46 Castaldi, 95.
47 Castaldi, 175.
48 Tanner, Kenneth and Jeffery A. Lackney. 2006. *Educational facilities planning: Leadership, architecture, and management.* Boston: Pearson Education, Inc, 101.

Like Castaldi, Lackney and Tanner explain how a critical analysis of the context and community is needed to create a successful design. The ability for growth and the facilities flexibility for advancements ensure as sustainable school. Thus, incorporating the tools of tomorrow into the schools of today is a means of ensuring the continued relevance of schools.

D. STUDENT PERSPECTIVE

The inner city is overwhelmed with many problems due to the troubles in the current economic and political status. The effect of economic discrepancies in the United States is evident in the built environment, but little has been done to combat these problems. Therefore children are offered different educations based on their locality. Low test scores and low enrollment in inner city schools are the effect of these poor educational facility conditions. Funding for inner city schools is often the major deterrent for developing better school systems.

In many studies regarding the cognitive perspective, such as the Humanscapes project, findings indicate that minor adjustments to present buildings or new school buildings can enhance the student psychological effects of school environments.[49] Obasanjo examines, in his Chicago Study, a critical analysis of a Chicago Public School, the impact the educational environment can have on inner city students. In Obasanjo's findings, adolescents within the lower income bracket in the inner city areas with poor quality environments tend to have a deficit in attention and an increase in frustration, showing the need for the critical analysis of inner city educational facilities.[50] There are methods that can be implemented to combat the decline in progression of inner city youth. For example, inner city persons of low income tend to show higher levels of stress and frustration which can be reduced by the introduction of natural greenery shown by psychological

49 Obasanjo, Olusegun Olutosin. The Impact of the Physical Environment on Adolescents in the inner city. University of Michigan. 1998. 161
50 Obasanjo, 155.

studies.[51] The environmental stress paradigm focuses on housing quality, neighborhood quality, and restorative resources to construct a critical analysis of the inner city child psyche.[52] Students spend a majority of their time in educational facilities, which means schools have a large impact on the development of children. Through the environmental stress analysis, features can be implemented to create a more interactive educational facility for high school students.

Many of these issues have been rectified through the student centered approach by which students are fundamentally involved in their learning process. Advisors within this model work cooperatively with students rather than solely using a top down approach. The Breaking Ranks model concluded that the students, Obasanjo found most at risk, were positively affected by lower class sizes, fundamental to the student centered philosophy. [53]

Culture and community, safety, school planning/longevity and the student perspective are the major themes in the current body of sources. The common thread that still remains is the inability for inner cities school systems to provide sufficient high schools for their youth. An alternative paradigm is needed in reevaluating and redesigning these schools. These sources fail to respond to the student perspective which has left school learning environments inadequate to meet the needs of students. High school students need a school environment that supports their learning experience in a more deliberate fashion, because as previous studies show current schools fail to connect with the student body. By introducing new school functions that interest students and more comfortable classroom environments, educational facilities in inner cities can begin to meet student needs and enhance positive development.

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51 Obasanjo. 161
52 Obasanjo, 156
53 Lachat. 27

IV. CASE STUDIES

With recent attemtps to reform public education across the nation, a new breed of schools has been developed. As this thesis looks to develop a new model high school, the following case studies explore contemporary high school models through their history, typology, pedagogy, architectural design, and contextual factors.

First, The Lyne and Harry Bradley School of Technology and Trades is a contemporary example of a Milwaukee Public High School. Bradley Tech is an attempt to develop a new educational model incorporating the trades. The program, design, and curriculum are different than any other high school in Milwaukee, Wisconsin.

The second case study, High Tech High School, is an innovative public charter school in San Diego, California that brought project based learning to the forefront of education. HTH sets itelf apart from other project based learning models by fully integrating technologies into instruction. HTH offers a unique look into contemporary educational practices.

The third case study, The Met, is a unique high school built upon a project-based pedagogy and a community based approach. The design reflects the community based philosophy and assures availability to the community from morning to evening. The design allows for independent research, project and group work, and family and community involvement.

In an attempt to redefine high schools as community institutions, the final case study is an analysis of the Yesler Community Center in Seattle, Washington. Specifically, the technical center component illustrates the effectiveness of public resources. The Yesler Community Center is one of dozens of community tech centers across Seattle aimed toward developing digital literacy, especially within lower income groups.

A. BRADLEY TECH

Architecture Firm: Hammel, Green and Abrahamson, Inc. (HGA) and Continuum Architects and Planners

Contractor: Hunzinger/Clark Joint Venture

Client: Milwaukee Public Schools

1. HISTORY

The Bradley Tech highs school sits on the south side of Milwaukee serving as a four-year comprehensive academic and technical education. The school is a rebirth of the original Milwaukee School of Trades which was founded in 1906. Bradley Tech operates on a public-private partnership for funding. The new school was possible due to a large grant of $20 million from Jane Bradley Pettit in 1999, $23.6 million in public funding, and $13 million in private donations.[54] The large budget offered a unique opportunity for the Milwaukee Public School system to create a high school suited for 21st century education. Hammel, Green and Abrahamson, Inc. (HGA) was the architectural firm for the project. The photo below shows the south facade along the main commercial avenue.

(Fig.1) Bradley Tech at National Street

54 Bradley Tech. About Bradley Tech. 2008. http://www2.milwaukee.k12.wi.us/new_tech/AboutTech.html.

(Fig.2) The above image displays the footprint of the building in the residential context

2. SCHOOL TYPE

The school was originally conceived as a "research-based learner-center curriculum" with the obligation to still meet state and national standards.[55] The school offers all of the core directives within math, science, social studies, and English while offering technical education specialties in biotechnology, communication, construction, engineering, and manufacturing. In accordance to the unique learning curriculum the building was meant to provide spaces for individual work, group projects, technical labs, and open classrooms. In addition the school boasts a city involvement with local businesses and post-secondary institutions like Youth Apprenticeship, Industrial Cooperative Education, credit/course articulation, Air Force Junior ROTC, and Rehab House projects.[56] On site analysis and interviews with the staff, MPS, and facility designers gave a complete study of Bradley Tech.

55 Milwaukee Public Schools (MPS). Bradely Tech Information Page. Lynde and Harry Bradley Trade School and Technology. 2009. http://mpsportal.milwaukee.k12.wi.us/portal
56 Bradley Tech

3. CONTEXT

The south side of Milwaukee, WI is primarily known for being the Hispanic district including a diverse mixture of commercial, residential, and industry. The area is primarily composed of persons within the lower income range. In addition the area is known for theft and violence. The area is quite dense so the school was constrained to a landlocked site. The south side of the school fronts the commercial corridor along National Ave., while the remaining facades face residential (see figure 1). The large regulation sized soccer field sits on the north side of the building adjacent to residential.

4. SCHOOL PEDAGOGY CONCEPT

The school was meant to be a project based school that featured three core trade components: manufacturing, communication, and construction. In an attempt to break away from the standard comprehensive high school philosophy the school embraced the small learning community philosophy as to improve student achievement. The architects and MPS had specific agenda when designing the program and building, however after completion of the innovative trade focused school not everyone was on board.

Fig.3

5. DESIGN

MPS drew up a document detailing the program requirements for the architects, so the design team was able to focus on the design element of the building. Initially the school was supposed to utilize a portion or all of the existing school that sat on the site, however the architects found that it was not economically or logistically feasible to do so. Including the large grass field and service requirements the school

(Fig.4) Typical Bradley Tech floor plan

facility takes up three city blocks with three levels. The architects and MPS agreed that the building's design was to be driven by the program, project based. Due to the schools focus on trades the architects felt that it was more necessary to use materials that could withstand the abuse. The school utilizes cmu, unfinished concrete, rubber, ceramic tile, and corrugated metal panels. As the students would be partaking in wood construction, welding, and various fabrication exercises, the material pallet seems appropriate.

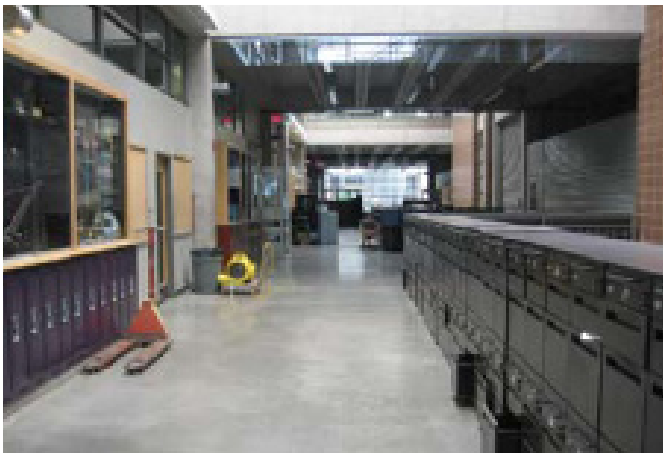
With the program informing the design, the architects created an open plan school with multi-use spaces and a unique learning composition. The entry space is a large two level space which doubles as the dining area and auditorium, aptly named the "cafetorium". The idea for the double use space is moving in the right direction for innovative solutions, however the execution was not very successful. The small stage that was appropriated to the "cafetorium" does nothing but elevate a speaker or presenter. The classrooms, which the faculty dubbed "pods", contain both the traditional desk area and tech center. The image above illustrates a typical floor show the spatial organization of the "pods." The "pods" originally were designed with no partitions along the corridor, which was premised on the idea that students had the freedom to move about and minimal lecture time. Taking the design program even further, the school was designed with no lockers or any kind of built-in personal storage space. Instead, students were given wheeled,

metal storage containers for tools and supplies. The design was great in concept and if the faculty was onboard the school could have succeeded. The one major flaw in the design that would exist anyway is the overwhelming noise. Almost all of the staff said that the cafetorium, pods, and hallways create so much noise that it interferes with instruction. The make shift partitions along the pod corridors and the enormous flag within the cafetorium were two later attempts to mitigate noise.[57]

The program concept and the functional components have come up short in the Bradley Tech design, but the form and the way the building presents itself to the community have promise. Each person I interviewed felt that the school was beautiful and it is a "great looking building". The architects utilized a curved metal roof to display the schools unique character and were able to create a foot print that both respects inner city character and welcomes the community. At a final price tag of $50 million the school may not have met expectations, but it seems that Milwaukee educators and designers have learned a valuable lesson when it comes to innovation in education.

6. AESTHETICS AND ATMOSPHERE

The building fits well with in its context and introduced a unique character to the neighborhood. The stainless steel and concrete materials display the trades focus that the school promotes (see figure 3). All of this creates an interesting exterior however it does



(Fig. 5) To the right, is a photo of the rolling storage bins that students were initially meant to take with them, from class to class. However, they were not used and were finally located as traditional lockers.

57 Hammel, Green and Abrahamson, Inc. Bradley Tech. HGA. 2008 http://www.hga.com/

not translate into the interior. The concrete structure and the steel glazing frame do not create the energetic atmosphere within the classroom. In addition, the materials chose account for much of the noise.

7. ANALYSIS

ENGAGING THE CONTEXT

The facility is a monolithic structure which uses approximately half of the site. Certain components of the building, like the gymnasium extend away from the primary building breaking up the monotony of the building, creating a pedestrian scale along each face . In addition, the north portion of the building is lower than southern half to respond to the lower roof lines of the residential homes. The building is situated along the commercial corridor on the corner creating a strong connection to its context. The main south facade fronting the commercial corridor responds to the scale of the neighboring buildings. In addition the minimal separation between the road and the building is a reaction to the commercial use. However, the south is not the main entry and is essentially a false facade.

The main entry along the west side flows into the large communal atrium space: the cafetorium. Situating the primary entry along the west side is a definitive attempt to create a connection to the residential neighborhood. The soccer field creates a large green open space for not only the school to utilize but also the neighborhood. The structure in the southwest corner is an existing stairway that leads into a tunnel which goes underneath National Ave. to the elementary school kitty corner to the school. Utilizing the existing pathway creates a literal connection between younger students and high school students. Parking was initially allocated to an adjacent site depicted in grey in the site plan. However, as time passed the open space near the main entry, originally intended to be used by the neighboring elementary school, was adopted as additional parking space.

FUNCTION

"Cafetorium"

Bradley Tech high school is a mixture of contemporary design strategies in its concept of flexibility and new learning curriculum. The building serves as an example of how contemporary design strategies can come up short when put into practice.

The primary entry point is a multi-functional space, serving as the cafeteria, auditorium, and entrance hall. The cafetorium is not a successful combination of multi purpose space due to several reasons. First, the large volume creates a large amount of noise because of empty and material choices. The noise became such a disturbance that an American flag extending the entire height of the atrium was hung to aborb the sound. Second, the small stage area is not sufficient for supporting more formal presentations or gatherings. In addition the space is much longer than it is deep which creates an awkward space for lectures. (see figure 6 & 7) Third, the entry does not define a direct path to the main administration area. Instead the designers chose to place the administration on the second floor and put a security desk in the lobby. Arguably the security desk supports a safer school entry, on the other hand the lack of a visible administration area takes

(Fig. 6 & 7)) Above, are photos of the "cafetorium" and the American flag used to absorb sound after many noise issues.

away from the connection between the public. Figure 5 displays the administration area, located above the security desk. The advantage from this multi-purpose space is that it saves on space. In addition the atrium creates a monumental entry and allows natural light to penetrate deep into the large space.

"Pods"

In the initial design of the school MPS planned to integrate a new program model. The model called for an open plan to support a project based learning environment. Project based learning environments were developed into "pods". These "pods" created a small community of students and faculty (see figure 4). The space was broken up into a student work area, lecture area, computer lab, and teacher's area. Figure 6 shows a typical floor plan including a "pod" and open lab. Below figure 7 is a larger drawing of a pod and the adjoining open lab space across the corridor. In the initial design concept the entire floor was meant be an open plan. However, as students and faculty began to use the facility they found that the open plan was not appropriate for traditional learning. As described in the design section, the faculty did not follow through with MPSs new learning goals so the school was not utilized as first intended. The reality is that the school faculty was not on board with the project based method, so teachers taught as they always did. In addition, the staff found without a wall to separate the classroom from the circulation corridor, there is too much noise. The complaints from the faculty forced the architects to install partitions along the corridor, but because the HVAC system was designed on an open plan the partitions were only able to rise up just beneath ventilation ducts.

The advantages of the pod were that it placed students and faculty together. Students could access the advisement of teachers while they were working on projects. Since separate areas were designated for computers and traditional desks, teachers had the ability to change up the lesson plan whenever they felt it was necessary. This allowed for changes in classroom activity without creating too much distraction.

B. HIGH TECH HIGH

Lead Firm:

Carrier Johnson

Design Team:

Christopher Gerber (Project Manager/Designer)

Viveca Bissonnette (Project Designer)

David Stephen (Director of Design)

Planner:

David Stephen Design

1. **HISTORY**

High Tech High School (HTH) is a public charter in San Diego, California that opened in 2000. The high school was developed over a two year period under a coalition of 40 public and private partners led by Qualcomm executive Gary Jacobs.[58] The school operates as a non-profit corporation with a five-member board of directors. The school was an experimental project aimed toward developing an educational system focused in telecommunications and biotechnology, departing from the region's military dominated economy. The school raised a lot of attention because of its innovative vision for contemporary education. HTH devoted its curriculum to "collaboration, technology, com-

(Fig.8) Exterior Photo of HTH

58 Neumann, Richard. Charter Schools and Innovation: The High Tech High Model. American Secondary Education. Summer 2008.

munication, art and design, ethics and responsibility, and habits of mind."[59] Consequently, the unmarked curriculum utilized a unique instructional model, inquiry based learning. The inquiry model is one that relies on student's getting hands on experience through projects and multidisciplinary studies.

This progressive approach to learning caused the school partners to find a venue fitting for such a new endeavor. HTH found its home in a Naval Training Center that was constructed in the 1950s. The Naval facility was a large and open structure that allowed the designers to create a unique space within the interior. In the schools first year of operation HTH welcomed 200 new students from ninth to tenth grade. However, with the great success of the school HTH has expanded to 2,500 students dispersed among eight schools spanning from k-12.[60] The original high school is still in operation with a current enrollment of 490 students at the HTH Village. This case study will focus on the original campus: The Gary and Jerri-Ann Jacobs High Tech High.

(Fig. 9) Above, is a photo of a typical HTH classroom showing students utilizing the wireless network.

59 Neumann
60 DesignShare. Project: High Tech High. Design Share: Designing for Future Learning. September 2009. http://www.designshare.com/index.php/projects/high-tech-high-international

2. SCHOOL TYPOLOGY

HTH is a four-year public charter school that focuses on student interests and community engagement. The skills that students learn in school are utilized within the community, thus facilitating a broader reach within the area. HTH follows a typical small learning community model, in which students are grouped into advisories of 12-15 students with one primary advisor/instructor. However, advisors are expected to operate in groups as well, so that they coordinate on their lesson plans ensuring that students obtain a comprehensive education. These teams of teachers are responsible for up to 60 students.

Utilizing the project based learning model students partake in a variety of different activities throughout their tenure, depending on their interests. These activities and experiences include internships, college courses, senior projects, an International Academic Program, music studies, and Student Interest Groups (SIG). SIGs are fitness and hobby focused classes that include soccer, dance, rock climbing, tai kwan do, chess etc.[61]

Students develop and work on projects throughout their four year experience, but once students reach the 11th grade they partake in alternative and enriching experiences. 11th and 12th grade students are placed into the Manpower Academic Internship Program, an off-site internship within the San Diego County area. These students are matched up with an individual mentor at a business where they are to work for 8-10 hours per week. As a student's education culminates they are expected to complete a senior keystone project, in which they demonstrate all their skills. These projects are much like other projects but much more in-depth and in a specific are such as "environmental studies, international design and architecture, religion and philosophy."[62] The valuable skills students learn are projected into the San Diego area which demonstrates the schools community based focus.

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61 HTH. The Gary and Jerry-Ann Jacobs High Tech High School. September 2009. http://www.hightech-high.org/schools/HTH
62 HTH.

(Fig. 10) Aerial photo of HTH context

3. CONTEXT

The Gary and Jerri-Ann Jacobs HT-High School is located in the High Tech High Village, which includes the HTH Media Arts School and HTH International School. Just off the North San Diego Bay, the village was originally a United States Navy property and is directly across from The San Diego International Lindberg Airfield and the North Island NAS Halsey Field. HTH is separated from the airfields by the bay and a small water inlet.

The school campus seems to be rather isolated in comparison to the other two case studies. The aerial photo above shows where the school sits within its context. However, The HTH village resides off Rosesrans Street, a major vehicular artery, and is directly on a bus route. In addition, the neighborhood that surrounds the Village is primarily a residential area so it is easily accessible to the community by car or bus. The HTH Village sits between a small suburb development and Global Leaders University, S.D. Campus. The San Diego business district is located on the other side of the bay, where the High Tech Professionals campus is situated.

4. SCHOOL PEDAGOGY

HTH is a non-traditional school that utilizes the project based learning model within small learning communities. The project based learning pedagogy was derived from the "school's emphasis on team teaching, integration of technology, and assessment through presentation and exhibition."[63] Integrated into the project based learning model are three basic principles: Personalization, Common Intellectual Mission, Adult World Connection.

Students are expected to obtain hands on experience by applying conventional disciplines of math, science, English, and social studies into comprehensive technology based projects. Projects are personalized for each student allowing for projects to evolve organically. The project based method within HTH includes a variety of different learning techniques "lectures, demonstrations, videos, and the arrangement of guest speakers, among other methods."[64] The primary objective is to, "offer students a high quality broad-based education that will serve them well in all phases of adult life."[65] The initial premise behind the philosophy was to prepare students for their future careers, the real-world, by aiding them in gaining skills that businesses look for. Integration of several disciplines within one project allows students to gain a deeper understanding of subjects.

(Fig. 11) HTH First Floor Plan

63 DesignShare
64 Neumann
65 HTH

(Fig. 12) HTH Second Floor Plan

The project-based model within HTH goes beyond the typical school culture by way of their community based integration. Internships and senior projects allow the community to interact on a regular basis. Students offer their services to businesses, which include non-profits, and professionals offer their expertise through guest lectures and mentoring. In addition, the small student body and small advisories permits more interaction among the students, staff, and professionals. Thus, everyone seems to learn from everyone else.

5. DESIGN

"Design of the school began with an intensive and collaborative workshop to gather ideas and information. Participants included the design team, school administrators and planners, contractor, board members, facility manager, teachers, and students. The workshop defined the goals and vision for the new school and, at its conclusion, the team had clearly defined the program, plan, and preferred image."[66] As a result the design of the facility comprises ideas of the users as well as educational facility designers.

The design of the original HTH was an adaptive reuse project within a large Navy facility. In renovating the original building the architects felt the historical nature of the facility was significant, thus the shell was kept intact. The designers utilized the

66 DesignShare

large open volume to create free flowing spaces, which allows "for both structured and informal interaction between students and faculty."[67] The program includes a mixture of different learning spaces including, classrooms, studios, informal areas, and multi-purpose rooms. Throughout the building large windows within the envelope allow for an abundance of natural light.

The school contains a small student body and has a simple functional program. The emphasis on technology gave designers flexibility in the design allowing them to develop spaces conducive to media technologies. The facility is volumetrically divided into two main blocks that are separated by a terrace. The designers utilized the open volume to create two levels, which created four primary spaces: the commons and the 9th grade area on the first floor and the 10th grade area, 11th grade area, and the 12th grade area on the second floor.

(Fig. 13) HTH Discussion space

(Fig. 14) HTH UN Theater

On the first level, the main entry of the building opens up into the school commons, a double height space with a catwalk that goes across the space. The main commons includes a performance stage, the main

67 DesignShare

reception area, and an assortment of seating areas for groups. The two other main components within the entry are the student gallery space and the UN Theater. The gallery is a space to display student work, school fliers/announcements, or faculty work. The UN Theater is a teleconference space that allows for global interaction (see figure 14). The theater acts as a sculptural piece within the commons, because it is a stand alone, cylindrical volume that rises the full height of the commons. The commons is a light filled space that allows for a range of different activities to occur and gives direct sight lines to all other spaces. The ninth grade students are allocated to the rear of the first level which contains classrooms and science labs. In addition the music room is situated in the ninth grade space.

The second floor contains all student levels and the roof top terrace. "Classrooms are clustered into grade-specific neighborhoods centered around a studio area."[68] Teacher's offices are dispersed through the school, and are adjoined to a classroom to create the advisory. All teacher spaces have windows to that they can supervise students and be easily available. Students primarily use laptop computers to conduct research and work on projects, so the classrooms themselves are quite simple and contain tables and chairs.

(Fig. 15) HTH Commons

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Science labs and studio space are where students get hands-on and work in groups.

The simplicity of the classroom spaces in offset by several teaching tools. Operable partitions separate the classrooms and science labs to accommodate for different activities. Marker boards were incorporated into the operable walls to act as a writing surface and projection screen. In addition cork surfaces are built into walls to allow students to pin up drawings or presentations.

6. AESTHETIC/ATMOSPHERE

The small school environment creates an intimate and personal atmosphere that is not found in traditional high school environments. However, the inclusion of other HTH schools within the HTH village creates a larger school community. The open and light filled interior creates a welcoming atmosphere that breathes life into the everyday schedule of school. The image below is a photo of one of the typical studio areas where student conduct group meetings. It displays the amount of natural light that penetrates the interior. In addition, the use of colorful wall accent activate the space. Figure 7 is a photo of the UN Theater, which illustrates how spaces create an experience rather a bland classroom space. The flexible and tactile spaces allow students to customize rooms which create a sense of ownership for students. The unique space of "wall setbacks, heights, textures, along with an abundance of internal windows and natural light, recall an urban streetscape."[69]

7. ANALYSIS

Overall High Tech High seems to offer a flexible and dynamic environment well suited for the project based pedagogy. The simplicity of the classroom spaces in conjunction with tactile room materials creates spaces that allow students to work in many different ways and allow for customization. If students are allowed to customize and take ownership of a space they feel for comfortable, which can only enhance the learning

69 DesignShare

experience. The fluidity of the entire school fosters a social school community and offers a secure facility. Interior windows and the open circulation patterns allow for natural surveillance, knowing who comes in and goes out.

However in critique of the overall school system, it seems that the context of the neighborhood inhibits Adult World Connections. HTH is predicated on professional experience, therefore it seems that it should be closer in proximity to such resources. The San Diego business district is rather distant and students must travel to engage professionals on a regular basis. On the other hand, not knowing the actual commute time this critique is purely based on the physical relationship.

C. THE METROPOLITAN REGIONAL CAREER AND TECHNICAL CENTER

Design Team:

Steven B. Bingler (Principal in Charge of Design)

Paul Amago (Project Manager)

Jilian Shingledecker (Project Architect)

Edward Rowse Architects (Architect of Record)

Lead Firm:

Concordia LLC

Architect of Record:

Edward Rowse Architects, Inc.

1. HISTORY

The Metropolitan Regional Career and Technical Center or the MET is now in its fourteenth year of operation. By way of a public referendum in 1994 the Rhode Island Commissioner of Education Peter McWalters initiated the implementation of a innovative new high school in Rhode Island. McWalters commissioned doctors Dennis Littky and Elliot Washor, the principal and assistant principal of the award winning Thayer High School in New Hampshire, to design the goal and parameters of the 21st century school. The project was a public/private partnership with the Rhode Island Department of Em-

(Fig. 16) The Met

ployment and Training's Human Resources Investment Council (RIDE), The Annenberg Institute, CVS Corporation, and the Big Picture Company.[70] In essence the school operates as its own school district allowing the school to set its only curricula parameters and utilize private funding as a single entity.

The Big Picture Company, a non-profit created by Littky and Washor, manages the high school. The first freshman class of 50 students commenced in fall of 1996 in downtown Providence, Rhode Island within the state owned Shepard Building.[71] The Shepard building is part of the downtown campus of the University of Rhode Island. Thanks to a grant of $4 million by The Bill and Melinda Gates Foundation in 1999 the Met was able to create 12 more Met schools nationally. Since that time the school has received even more funding and has developed a total of 54 Met schools nationwide. In 2000 the original school moved from the Shepard Building into a new building on Peace Street in the West End of Providence. Recently following, two years later the Met opened a central campus of four small schools in the poorest area of Providence, the south side. Furthermore, the Big Picture Company has a nationwide network of 36 schools modeled after the MET within 12 states.

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70 The Metropolitan Regional Career and Technical Center. The Met. September 2009. http://www.themetschool.org/Metcenter/home.html.

71 The Metropolitan Regional Career and Technical Center.

The Met is a four-year public high school the "integrate academic and applied learning."[72] The Met operates on a small school structure with a total student population of approximately 700 students divided into eight small communities with a shared commons. Students are divided into groups of fourteen students and one teacher, making up the advisories. The teacher educates the same group of students through the entire tenure of the student. The Met model of advisories, internships, individual learning plans, senior exhibitions, and portfolios was declared as the required system for all new high schools within Rhode Island in 2003. "The centerpiece of the Met's curriculum [is] the Learning Through Internship."[73]

The pedagogy is illustrated throughout every aspect of the school including the daily schedule. Every day starts with a "Pick-Me-Up" which as an early morning discussion among the entire school, students and staff. The "Pick-Me-Up" allows students and faculty to discuss whatever is on their mind in an informal atmosphere. In one students words when describing the all school "Pick-Me-Up", "when your maximum school size is 150…it's not too much to ask."[74] From the school meeting student move on to their

(Fig. 17) The Met-Computer lab

72 Washor, Elliott and DesignShare.com. Innovative Pedagogy and School Facilities. Edited by Susan Meisel. Rhode Island: DesignShare.com, 2003. Page i
73 Washor. 30
74 McInstosh, Ewan. The MET Schools: an ingredient for the future of schooling? September 2007. http://edu.blogs.com/edublogs/blc07/index.html.

advisories which is where they spend the rest of the day.

3. ACCOUNTABILITY

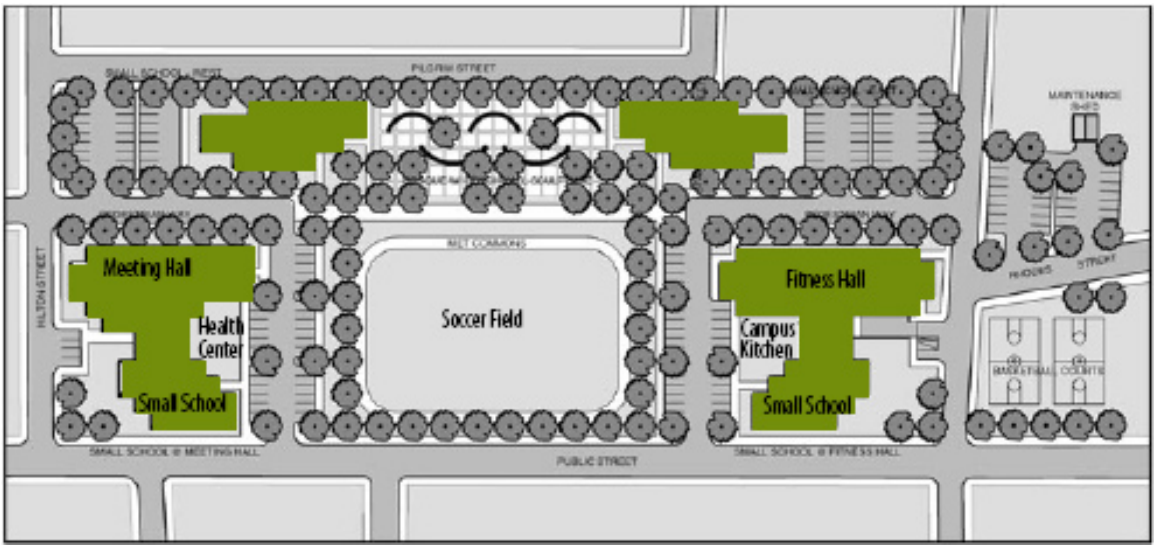
The Met has continued to be a strong precedent for high schools attempting to reform and become leaders in education. Educational systems look at the Met because of the success of its students. Based on 10 year averages the graduation, attendance, school climate, and parent involvement rates of the Met are well above all other major Providence High Schools:

Graduation-The Met (95%) Providence Schools (86%) State Average (89%)
Attendance-The Met (94%) Providence Schools (82%) State Average (90%)
School Climate-The Met (82%) Providence Schools (67%) State Average (68%)
Parent Involvement-The Met (80%) Providence Schools (36%) State Average (43%)

In addition over that past eight years 98% of Met students were college accepted and 75% of those students continued to attend after acceptance.[75]

4. CONTEXT

The school is broken up into several campuses with the central campus located within South Providence. For the sake of this case study the context of the main South



(Fig. 18) The MET Site Plan

75 The Metropolitan Regional Career and Technical Center

Providence campus will be discussed. The school is situated on the periphery of a concentrated area of businesses and surrounded by residential homes. The school has several separate structures on the site that surround a central green space (see figure 18). These structures were spread as far apart as possible to create autonomy among the separate schools. The architect believed that this gesture created a welcoming impression on the community while acting as a buffer.

The campus is located in an area adjacent to the Community College of Rhode Island, an Elementary school, and Miriam Hospital. In addition the campus is situated near Brown University, offering many resources to the Met. The proximity to these resources allows the school to facilitate direct and indirect connections within the community. The Met had to battle with the Rhode Island Department of Education, State Board of Regents, State Purchasing Office etc. to attain the sight, but the location offers all the necessary resources to operate successfully.

5. SCHOOL PEDAGOGY

"The Met is a small school that combines classroom learning with real world internships; engages teachers, mentors, and family members to create personalized learning plans for each student, and it uses comprehensive assessment tools to measure students' performance."[76] Students are expected to develop their own learning plans and goals with the advisory teacher based upon their individual "interests and passions."[77] Teachers evaluate their student's individual development and projects based on their demonstrations by way of exhibitions, presentations, and portfolios.

Beyond the educational pedagogy the Met operates within a community focused framework which supports neighborhood involvement. The Mets states that as a school, "it should be a community center, a gathering place, hosting local events and activities to

76 Washor. 2
77 Washor. 2

create a broader learning community."[78] The school involves working professionals and college students to engage the community that offers investment and benefits in both students and the public. For these reasons the Met is open 7am to 9pm daily.

6. DESIGN

As described in the school pedagogical system, the facility itself is meant to facilitate student focused environments that allow a diverse mixture of learning modalities and support community cooperation. "The architectural layout and image reflects the stakeholders' desire for smallness and a feeling of neighborhood scale."[79] Based on a functional standpoint the facility was meant to be flexible to changes in teaching methods. In addition the design goals had a deep investment in creating a sustainable environment in the long term. Not only did this include respecting ecological impacts but also communal arrangements. Meaning that the school could utilize existing resources, while bringing new resources so that the community could act as whole. The design of the first Met facility included ten major features that would guide the design by way of basic goals and philosophy:

(Fig. 19) The MET Firs Floor Plan

78 The Metropolitan Regional Career and Technical Center
79 Washor. 12

(Fig. 20) The MET Second Floor Plan

Personalization - Facilities where teachers and students meet and work are small and encourage students and teachers to get to know one another well, both intellectually and personally.

Following Interest - Facilities provide for student exploration of a variety of interests as well as facilitate connections between students and outside resources in the community

Authentic Learning - Facilities support learning that takes place all over the city. Rather than being organized only into classrooms, school space is organized for meetings, research, collaborative work, and individual skill building. Facilities enable real and "virtual" connections locally-with homes, businesses, and community-as well as to places and resources far beyond the local level

Community Building - Facilities foster a strong sense of community on several levels: from very small groups of students sharing a project or advisor; to the whole-Met community.

Community Partnership - Facilities are designed to integrate the Met and its community. Students and teachers use existing community resources, which new school facilities do not duplicate. Conversely, new facilities satisfy some community needs, and are available to the community from early morning to late evening.

Ownership - Met facilities, like the Met itself, are owned, and cared for by all users. Students and adults of the Met community take partial responsibility for the security and maintenance of these facilities, and all Met community members learn protocols of sharing space and resources.

Community Design and Diversity - The aesthetics and design of school facilities reflect the needs and desire of the diverse group that it the Met community, as expressed through public design meetings.

Flexibility - To ensure that the facilities always support the changing programs and functions of the Metropolitan Center, flexibility of interior and exterior

(Fig. 21) The Met

spaces is built into their design.

For All Students - The Metropolitan Center's facilities are accessible to students and adults with physical and learning disabilities.

State Education Leadership - As a model and center for education reform in Rhode Island, the Met's facilities host professional development and telecommunications activities for the state and for the nation.[80]

These ten goals and philosophies are significant in the design because they translate into the program and the functionality of the school. The school philosophy called for diverse programmatic elements that may not typically be in a high school. These unique program elements included a rock climbing wall, television studio, audio recording studio, and kitchen. The focus on student interests allows students to experiment in many different areas, making such a diverse program necessary.

The entrance lobby of the building was described by Washor as, "a cross between a hotel lobby and home."[81] This type of entry was developed out of discussions among students, faculty, community members, and the design team. The entry leads into the main gathering hall where "Pick-Me-Up" sessions and group gatherings occur. The large open space includes plenty of furniture for people to sit which serves much "like a

80 Washor. 31
81 Washor. 62

student union at a college."[82] In addition, the space and furniture chosen gives the school the opportunity to rearrange the space into small groups.

The advisories are the key component to the project-based work environment. The movable walls make those work spaces very flexible and allow for several arrangements. Advisories create a home base for students which allow them to take ownership within their school. This makes lockers obsolete because students can leave things in their own space. This not only saves precious space within the school footprint but it also save cost on construction.

7. AESTHETICS/ATMOSPHERE

The comfortable/communal atmosphere of the Met facilities derived from the architect's desire to use comfy and friendly materials that build upon the schools small school philosophy. Thus, the interior utilizes carpet, brick, and inviting colors to create a homey atmosphere. Furthermore, the utilization of moveable walls, nooks and crannies allows students and faculty to shape spaces conducive to many activities. The removable walls added a unique dimension to the flexibility of the school, although it was estimated that these walls cost $65,000 more than other walls. The architect also designed the spaces largely absent of any long interior corridors.[83] This not only added to the open feeling of the school but also created "clear lines of site to means of egress for safety and security."[84] This is important because the inherent components of the pedagogy built into the physical layout of the school produces a distinct advantage to safety.

The organization of the buildings around a central square created "town square" where the buildings face inward. What was most significant to creating an open "town square" was the exclusion of fences along the periphery of the facilities.

82 Washor. 63
83 Washor. 72
84 Washor. 63

8. ANALYSIS

The Met is a unique example of a school that carried their pedagogy throughout all aspects of the school. The student centered philosophy allows students to have a more active role in their education. In addition, the project based method allows students to have hands on experience with their assignments. The architectural design of the school permits all of these activities to occur seamlessly. From the "town square" layout of the structures to the organization of the advisories the school illustrates the notion "form follows function."[85] The most significant features of the Met are the pedagogy itself and the diversity in working environments. Were a traditional school is focused on efficiency, the Met is focused on creating an environment conducive to learning.

D. YESLER COMMUNITY CENTER

Architecture Firm:

Mithun Inc. Landscaping, Interior, and Architecture

Contractor:

Berschauer Phillips Construction Company

Client:

Seattle Parks and Recreation, City of Seattle

(Fig. 22) Yesler Community Center Main Entry

85 Washor. 63

1. PROGRAM BACKGROUND

Seattle, Washington has developed a public program aimed toward "promoting a technology healthy community."[86] The initiative dubbed the Communities Connect Network is "a statewide coalition of public and private organizations working to ensure that Washington state is a leader in "digital inclusion."[87] The public program is a city wide initiative that provides a diverse technology based service. The program is facilitated through Community Technology Centers which is dispersed throughout the City of Seattle in several ways: public housing developments, low-income housing centers, family centers, stand alone centers, non-profit social service agencies, faith organizations, mutual assistance associations, and public schools.

CTCs are facilities that provide a range of public services geared toward youth, senior citizens, minorities, low-income people and new residents. The CTC has a diverse service function including job skill development, lifelong learning, community building, and civic participation. They allow the public to have access to tutorials, computers, internet, advanced training, software, and a support staff. In addition, the facilities allow

(Fig. 23) Yesler Community Center

86 Department of Information Technology (DIT). Community Tech Centers. Seattle.Gov. 2009. http://seattle.gov/tech/ctc/

87 Communities Connect Network (CTC). CTC Conference: Communicating CTC Impact to the Legislature. University of Washington Information School and City of Seattle Department of Information Technology. November 30, 2007. http://seattle.gov/tech/ctc/techlinks.htm

for many other uses like public meetings, electronic hearings, and conferencing. The program reaches far into the community by funding other organizations like Boys and Girls clubs that promote digital literacy. The initial initiative was focused on developing literacy in technology, but it seems to provide a broader social service by engaging the community.

The CTC program relies on employing some staff to manage the facilities and programs. CTC managers can take on any number of responsibilities depending on size and funding capabilities, which include: CTC monitor, volunteer coordinator, outreach worker, hardware technician, and instructor. The City of Seattle funds the staffing needs for these programs city cable franchise funds, therefore the fees placed on cable companies are put back into the community. This is significant because it illustrates how such a program can be funded without taking away from the city budget.

2. HISTORY

This case study will focus on one specific CTC, the Yesler Community Center, demonstrating the benefits of such a program within a low-income community. Yesler is just one of eleven communities that were specified to receive funds for the expansion or development of a community tech center. The Yesler Community Center is a standalone facility located in the Yesler Terrace development, a property of the Seattle Housing Authority. Yeslar Terrace was the first public housing development in Washington and the first racially integrated housing development in the United States. The facility replaced an existing community center that was 4,700 sf, which primarily functioned as a recreational building with a small gym.

3. BUILDING TYPOLOGY

Community Tech Centers (CTC) are programs that can aid in servicing the broader public community. Much like a public library system the Community Technology program offers free resources to communities. However, these technology

programs are unique because they offer a wider range of resources. If schools can be coordinated with CTCs they can serve as community hubs. Most public schools claim to engage the community that they are located in. However, many school's public engagement and support is stifled by the lack of funding, constrained staffing capabilities, and the perception of lack of safety. Consequently, schools rarely have the ability to serve public needs beyond the student body. The influence of community centers within a neighborhood is often overlooked and little notice is given to their impact. But as Lawrence Cheek explains, "they affect the intimate life of the city much more than splashy projects like the Central Library."[88]

The Yesler Community is designated as a community tech center because it offers free public access to digital resources including internet, computers, and tutorials. However, the building includes many other functions. The diversity of the program illustrates how many dissimilar resources can be integrated into one facility, creating a more active and useful resource. The similarity of the diversity in program elements to a high school makes it easy to relate such a project to educational design. Thus, the information within this case study can be extrapolated into an educational context.

4. CONTEXT

The Yesler Community Center is located in the heart of the Yesler Terrace low income housing development. Beyond the housing the development is surrounded by a mixture of different land uses, including a large medical center and small businesses. The business district is located far outside the neighborhood, across the freeway. The facility is relatively isolated from the context outside the development. However, considering that it is a community center prescribed for the use of the low income area the isolation if not relative.

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88 Cheek, Lawrence. On Architecture: It's the little things. Seattle Pi: Theater/Fine Arts. June 25, 2007. http://www.seattlepi.com/visualart/321196_architecture26.html.

(Fig. 24) Yesler Community Center context

The micro context within the low income area includes mostly housing, a large park, church, bank, and small businesses. The facility is adjacent to the park, which creates a communal hub for residents allowing for social interaction in many different manners. In addition, a children's playground is located directly on the premises. The architects attempted to make the facility pedestrian oriented by buffering the parking space and located it in the rear of the property. In addition, there is a bus stop near the building which allows people outside the neighborhood to access the community center.

5. DESIGN

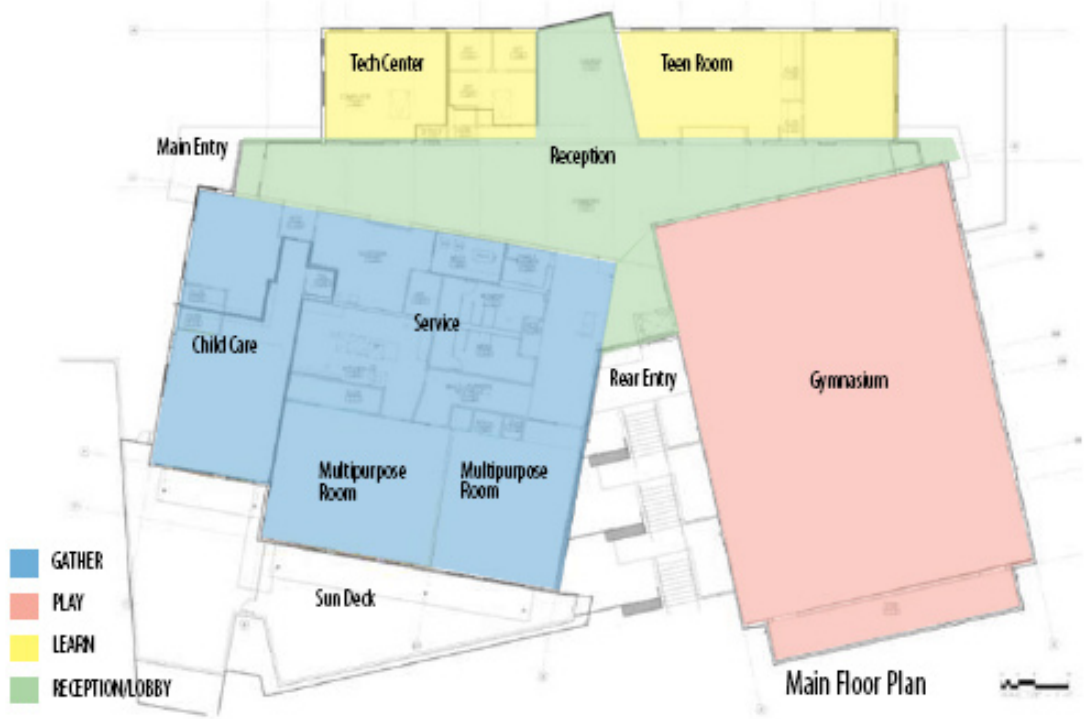
Construction of the project began in 2003 and was preordained to be LEED building, promoting environmental and economic responsibility. The building is located at the center of the neighborhood and it situated on a sloping site. The community center is a multipurpose facility acting as a destination for the inner city neighborhood, offering many valuable resources. The center replacing the old building would be a much larger building of 20,000 sf, including a multitude of different programmatic elements: Regulation size gymnasium (7,178 sf), multipurpose space (2,700 sf), kitchen (450 sf), reception/lobby (1200 sf), administration area (90 sf), arts and crafts room (550 sf), fitness room (550 sf), game room (700 sf), teen room (700 sf), child care (1045 sf), library

and computer room (400 sf), restroom/showers (530 sf).[89]

In specific the library and computer room was defined as the computer tech center. The tech center includes 20 desktop computers, all with network capability. A overhead projector is located in the room for any presentations. In addition the space includes several tutoring and small meeting tables to accomodate for group gatherings or one on one lessons. The library component included a reference section and class books for students.

The multipurpose spaces are intended to serve a variety of functions including small receptions/banquets, group activities, and even dance or aerobics classes. Moveable walls were utilized so that the room could be reorganized for whatever activity is taking place.

The footprint of the building is rather irregular with three 'blocks' skewed at different angles. The blocks identify three different functions: Learn, Play, and Gather.[90] However, this irregularity serves a few distinct purposes. First, the architects wanted to



(Fig. 25) Yesler Community Center First Floor Plan

89 Seattle Department of Parks and Recreation (DPR). Yesler Community Center: Final Design Program. March 1, 2002. http://www.seattle.gov/parks/centers/current/Yesler_Community_Center
90 Mithun. Yesler Community Center Fact Sheet. 2005. Seattle, Washington.

promote a safe and secure environment, so the separation and angles of the three main 'blocks' offer clear views inside and outside. Second, the odd position of the building avoided the need to cut down several large oak trees on the sight. Third, the separation allows the building to capture an enormous amount of natural light and airflow for the interior spaces. Fourth, the skewed lines of the structure relate to the "cockeyed street grid of the neighborhood, which invests the building with a subliminal familiarity for its users."[91] The irregularity offered a number of unique advantages, but overall these irregularities created a pedestrian friendly building.

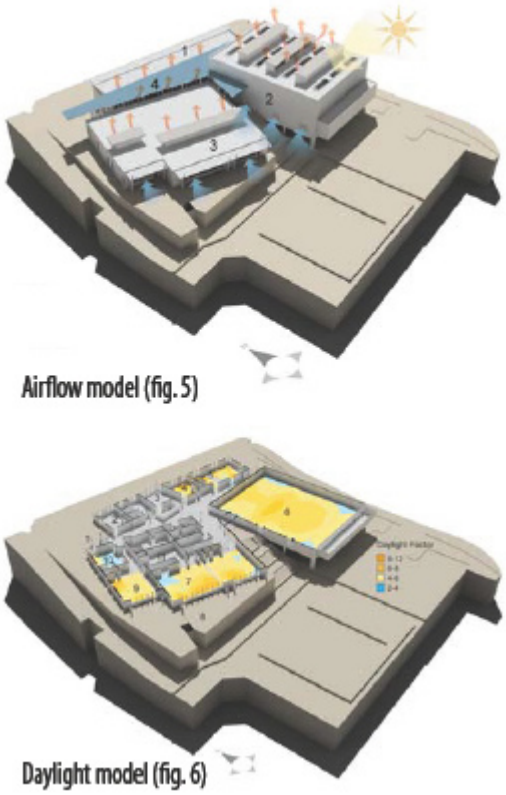
Outside the irregular footprint of the structure the inner circulation is rather simplistic. The two primary entrances open into a singular corridor with all spaces easily visible. The reception desk is at the center of the building, where the corridor expands to create an informal gathering place. The reception area allows one person to monitor the public and also serves as the checkout counter. In addition the lobby area is a space to exhibit awards, trophies, or announcements. The primary façade at the higher point of the site has a residential scale while the rear is much larger because of the gymnasium. The pedestrian oriented entry way is at the higher point of the site. All of the spaces are located on the periphery of the building, allowing light into every space except for the kitchen.

6. SUSTAINABILITY

A major component to the design of the building is the sustainable approach. The designers used the sloping site to minimize the overall footprint, placing some of the parking within the slope. The architects also used a number of different passive environmental controls including operable skylights, high windows controlled by motors, overhangs, building orientation, and native trees. Over 75% of the spaces are utilizing natural daylight. Figures 5 and 6 are 3D model simulations of the airflow and daylight produc-

91 Mithun. Yesler Community Center Fact Sheet. 2005. Seattle, Washington.

tion of the facility created by Mithun's environmental consultant, Seattle Daylighting Lab. In addition designers chose a diverse material pallet that included recycled material and flooring made from natural ingredients with 20% of the materials coming from regional sources.



(Fig. 26) 3D modeling

7. AESTHETICS/ATMOSPHERE

The promotion of a pedestrian scale, passive environmental controls, and the diverse program create a communal and friendly environment. Utilizing the slope to minimize its size created a pedestrian scale, thus cultivating a public atmosphere. In addition, the decision to have a diverse program allows many different types of activities to occur, which seems to create an active and unique environment. The child care center, gymnasium, and computer center allow many different ages to commingle. The flexibility designed in the building and each room allows the public to customize spaces which develops a sense of ownership for the community. The warm colors, natural materials, and simplistic circulation promote an easy to access and friendly facility.

8. ANALYSIS

The Yesler Community Center is a unique example of a multipurpose neighborhood facility that is available to the public for free. The technology focus allows the public access to digital resources that are available to them inside their home. The technology function offers people the chance to get career training, job search, create

resumes, and access many different types of media. Computers, projectors, and work tables allows a variety of functions to occur in the tech center.

(Fig. 27) Yesler Community Center

Furthermore the multipurpose space offers additional meeting space for community gatherings. The child care is a quick and easy solution to parents that need day care in close proximity. The gymnasium offers a place for kids and adults to have group recreation activities. Multipurpose rooms allow for any number of activities including neighborhood meetings and craft projects.

The utilization of passive environmental controls will continue to keep operation costs at a minimum. The operable windows allow patrons to adjust the room, which adds another level of ownership for the public. In addition the facility can serve as teaching tool to explain what environmental design entails.

All of these unique components come together in the Yesler Community Center offering a valuable resource. If these same components were integrated into a high school program it could become a dynamic community hub. Students could run some of the programs and the public could use the facilities. Students are expected to gain real work experience and what better way than to interact with the community. In addition, the multitude of different social services provided by such a facility could develop a communal pride.

V. LEARNING COMMUNITY

"Educational buildings should, whilst supporting the pedagogic mission of the particular institute, provide both exemplary physical and civic environments, whilst providing for the needs of the individual they must also help cultivate a special sense of community. As natural centres of society educational buildings need to be both engaging and inviting."

-Behnisch

The unique pedagogy of project based learning is built on a philosophy of bridging relationships between student and student, student and community, student and teacher, and school and parent. Consequently, project based learning is instilled with many unique characteristics, applied skill activities, student-advisor communication, group learning, and community engagement, as a means to facilitate relationship building. These unique components carry with them a need for specific spatial requirements and functional elements.

Student-advisor communication necessitates that the advisor be easily accessible to students. Group learning involves an array of different programmatic requirements where students can interact with each other in discussion or project activities. Community engagement requires the entire school to be accessible to the community, parents, and business professionals. This not only includes creating a welcoming facility, but also, locating a school where it can connect to neighborhood resources like businesses, parks, and public institutions. Each aspect of the project based learning model is directed toward developing relationships, thus the school environment requires a multitude of unique architectural elements.

FORGING STUDENT RELATIONSHIPS

An outcome of this thesis is to establish the understanding that schools should allow for a variety of learning means. These learning means are articulated as relational classifications of student to student, student to advisor, student to community, and school

to parent. These classifications parallel the four "primordial learning metaphors" first established by David Thornburg: Watering Hole, Campfire, the Cave, and Life.[92] The Watering Hole is a "conversational space occupied when learners converse among themselves or with their teachers."[93] The Campfire "is the informational space associated with lectures and other methods of direct instruction."[94] The Cave is a "space where ideas are developed in relative solitude and where student projects are designed and built."[95] Life "is the contextual space where the things that have been learned are applied in the world outside of school."[96] What follows is an exploration into the significance of the three relationships inherent to project based learning and the implications of such relationships on the physical educational environment.

(Fig. 28) College Students in Discussion

A. STUDENT TO STUDENT

Student to student relationships, akin to Thornburg's Watering Hole metaphor, are limited in the traditional approach to education. As Fielding and Nair state "most traditional schools actually discourage social interaction in school as a "distraction" and out of fear that when students socialize, they threaten the adult goal of discipline and compliance with adult rules."[97] However, as collaboration and personal interaction are among the top prerequisites for attaining success in the business world, student socialization

92 Thornburg, David D. "Campfires in Cyberspace: Primordial Metaphors for Learning in the 21st Century." Thornburg Center for Professional Development. October 2007. http://www.tcpd.org/
93 Thornburg
94 Thornburg
95 Thornburg
96 Thornburg
97 Fielding and Nair. 63

should be supported within school environments. In addition, as project based learning is built upon utilizing relationships, student to student interaction becomes of great importance. Furthermore, Crosnoe, Cavanagh, and Elder found "that peer support can promote achievement through increased motivation, more participation in academically related activities, and the general elevation of school as a priority in the adolescent's life."[98] Past peer learning programs have been established to study the successfulness of such activities. Following are research studies that have been conducted, that endorse student to student socialization and collaboration.

Peer-Assisted Learning Strategies (PALS) is a "class wide peer tutoring program in improving the reading performance of high-, average-, and low-performing students, including students with disabilities, from kindergarten through high school."[99] PALS was modeled after The Classwide Peer Tutoring (CWPT) program which is "a comprehensive instructional procedure or teaching strategy based on reciprocal peer tutoring and group reinforcement wherein an entire classroom of students is actively engaged in the process of learning and practicing basic academic skills simultaneously in a systematic fun way."[100] With the high school PALS program, students work in pairs or teams, including more proficient and low performing students, switching partners every day. Students work together reading aloud to one another and correct each other when one makes a mistake. PALS operates on a motivational system, where pairs earn PALS dollars for reading correctly, which they can redeem through a PALS catalog to purchase things like CDs, fast food coupons, or even sports apparel.

The research study conducted an analysis of twelve urban school districts and two suburban districts over a period of 15 years. The research found that such peer to peer

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98 Shin, Richard, Bryan Daly and Elizabeth Vera. The Relationships of *Peer* Norms, Ethnic Identity, and *Peer* Support *to School* Engagement in Urban Youth
99 McMaster, Kristen L. Research on Peer-Assisted Learning Strategies: The promise and limitations of peer-mediated instruction. 5
100 McMaster. 4

learning aids in developing "positive academic and social outcomes."[101] In specific, the PALS program has "demonstrated to be a promising strategy to promote literacy among seriously reading-delayed adolescents."[102] In addition, it was found that high school students that participated in the program fared much better than those who did not. However, the research study also found that the PALS program was not beneficial to all. "An estimated 20% of the low-achieving nondisabled students and more than 50% of students with disabilities have not responded to PALS." The most relevant finding was that high school students "prefer interacting with different classmates."[103] Thus, the assumption is that high school students, at least to some degree, would benefit from a more social educational environment. However this thesis does take into account that the motivational aspect of the PALS program does influence student's responsiveness to such peer activity. Essentially peer to peer activities "increase the proportion of instructional time" allowing students to continuously engage in academic behaviors, limiting the down time.

Crosnoe, Cavanagh and Elder's study examined student relationships based from the social perspective, studying the role of adolescent friendships in student's achievement. The large scale study used data from The National Longitudinal Study of Adolescent Health (AddHealth). AddHealth data included demographic information, family structure, and school information like size and performance level. Low performing schools within this study are primarily associated as urban and lower socioeconomic. Crosnoe, Cavanagh and Elder obtained approximately 90,000 student surveys that they distributed. In particular, the study examined the social implications of student relationships within racial demographics and urban regions. The study focused on the variation of white and African American students because of the literary differences between the two groups. Based on logistical reasons the study filtered out a select portion of the

101 McMaster. 10
102 McMaster. 11
103 McMaster. 11

students to study, resulting in a study sample of 9,223 adolescents in 144 schools.[104] The sample group of students was created by matching up students that completed the survey and were in the AddHealth database.

The study tracked groups of friends/students achievement and the level of off-track behavior. Off-track behavior is a summed unit that is an index of six binary items or criteria: 1) whether the student had repeated the last grade in school, 2) whether the adolescent had a low grade point average, 3) whether the student had trouble getting homework done in the previous school year, 4) whether the student had been suspended from school in the past year, 5) whether the student had been expelled from school in the past year, and 6) whether the student had a record of truancy in the last year. The study indicated that social friendships serve as a valuable academic resource, which followed their original hypothesis. "Academically oriented friendship groups could protect against academic problems."[105] For example, a .26 unit decrease in off-track behavior was associated with a 1 unit increase in student's friends' achievement. Furthermore, in comparing the high and low performing schools it was found that "high achieving friends was projective across the board, but even more so in schools were overall achievement was low."[106] Thus, relationships forged within the academic environment can aid in motivating students to do better in school and decrease truancy, especially in disadvantaged inner city areas.

1. STUDENT TO STUDENT: PHYSICAL ENVIRONMENT

In the search for new school models, the effectiveness of the classroom physical environment has come into question. Studies have shown that it is difficult to assess specific variables of the physical environment in isolation because teaching style has a major

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104 Crosnoe, Robert, Shannon Cavanagh and Glen H. Elder Jr. "Adolescent Friendships as Academic Resources: The Interaction of Friendship, Race, and School Disadvantage." Sociological Perspectives (Pacific Sociological Association) 46, no3 (2003): 331-352

105 Crosnoe, Cavanagh and Elder. 343

106 Crosnoe, Cavanagh and Elder. 345

(Fig. 28) Traditional Classroom

influence. On the other hand, research also shows that the arrangement of the classroom, the furniture, and enclosure (open or closed), do play a role in students success in school. The most studied feature of the classroom has been the arrangement of students within the space.

The Rows vs Tables study conducted by the University of Birmingham, led by Dr. Kevin Wheldall in 1982, explored the differences in student involvement in the comparison of rows and table clusters. It was found that "students work harder and are less disruptive is they sit in rows rather than in groups around tables."[107] In addition, the same study found that "time on task rose by 15 percent when students were seated in rows instead of at tables."[108] It was believed that rows were more successful, because rows limited student's opportunities to partake in negative interactions and gave teachers more control of the classroom. Clusters of tables were observed to be more conducive to group activity, but increase the frequency of negative interaction among students. However, alternative studies found that row arrangements create differences in student involvement,

107 Jacobs, Joanne. "Rows vs. Tables." Joanne Jacobs: Free-linking and thinking on Education. April 24, 2005. http://www.joannejacobs.com/2005/04/rows-vs-tables/

108 Jacobs

based on a student's position. Students positioned in the front and down the middle of the classroom, known as the action zone, are more involved.

Conversely, teachers have found that students arranged in a horse shoe shape offer the best arrangement. The horse shoe shape allows students to see each other, as well as the teacher. The former arrangements seem to promote a single activity, where as the latter promotes various activities. Thus, the horse shoe arrangement does not create a single action zone, because all tables are essentially in the same proximity to the teacher. However, student arrangement has been viewed as "a tool to support the learning process."[109] Meaning, student arrangement is governed by pedagogical ideals and instructional methods. It is important to note that most teachers utilize a number of different arrangements depending on the activity. Thus, flexibility of the space to support different arrangements is key to creating a successful classroom design. Consequently, furniture governs the flexibility of a space and plays a large role in the physical environment.

Most research has focused on the comfort quality of student furniture. Most school furniture is selected based on price, rather than the comfort and ergonomic qualities. A study that took anthropometric measurements of students' body dimensions found "that there was a substantial mismatch between students' body dimensions and furniture that they used."[110] In an experiment where students were given ergonomically designed furniture there was a "significant improvement in on-task behavior and a marked change in sitting positions following the introduction of the newly designed furniture."[111] It is important to note, different activities require different types of furniture. For example, someone reading may prefer a comfy lounge chair, while a student working on a project may require a rolling office chair.

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109 Woolner, Pamela, et al. A sound foundation? What we know about the impact of environments on learning and the implications for Building Schools for the Future
110 Woolner, Hall, Higgins, McCaughey and Wall. 55
111 Knight, G and Noyes, J. "Children's behaviour and the design of school furniture." Ergonomics 42, no. 5 (1999): 747-760.

In the traditional school, cells-and-bells, classrooms are self contained spaces and isolated from other spaces. The reasoning for this was that instruction was purely lecture based and emphasized individual work. As this thesis asserts that project based learning is the educational model of the future, such a space is ill suited for student work. Project based learning allows for various modes of learning like lecture, discussion, and individual applied activity. Thus, a learning studio must accommodate for student arrangements, furniture, and enclosures that allow for such activities. Essentially, a learning studio must be a multipurpose space and be flexible.

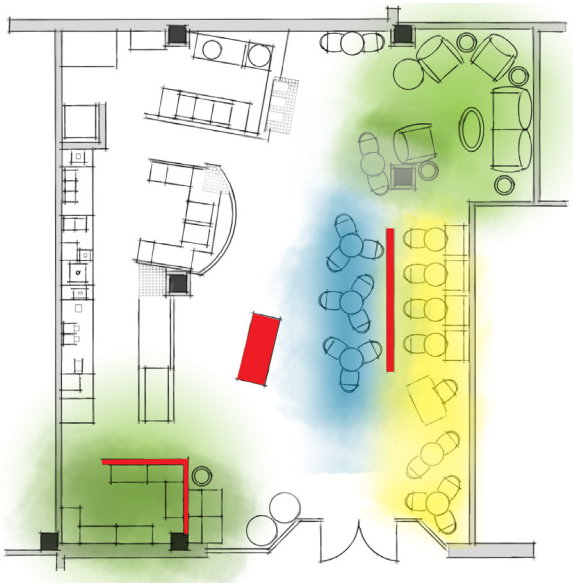
2. STUDENT TO STUDENT INTEGRATED IN DESIGN

Project based learning is grounded in the communication of students which involves the social interaction among peers. The school environment must encourage social conduct among students in a multitude of different ways. In this context social interaction includes large group discussion, small group meetings, study groups, brainstorming sessions, informal discussions etc. Conversely, students also require individual space to reflect and think. Therefore, the school environment must accommodate for all types of social interactions and attempt to utilize several different types within a single space. For example, applied skill activity is a primary component to project based learning, where students interact with peers through activities and projects to build communication skills. Applied skill activities require multi-purpose space where students can utilize different types of media like computers, cameras, books, art supplies, and craft materials to fulfill the objectives of project based learning. Furthermore, personalization for each student may require a varying need of space. As result the physical space must be more than a traditional classroom solely consisting of desks and chairs. Fundamentally the classroom has to act as a discussion area, a science lab, art space and presentation space. Nair and Fielding explain, “Spaces in which science and art are learned to have the kind

of richness that these disciplines themselves possess."[112] Likewise, spaces for discussion and presentation have certain design characteristics that make them conducive for such activities. Examining each of these- discussion area, science lab, art space, and presentation space- functional uses in regard to their unique spatial environment aided in developing the most suitable space for all these activities to occur. The more types of social interactions allowed for, the more flexible and useful a space.

3. STUDENT TO STUDENT INTEGRATED IN DESIGN: DISCUSSION AREA

Thornburg described the space where student to student interaction occurs through the metaphor of the "watering hole" where students partake in discussion. Discussion accounts for the many different modes of social interaction that occur within a school setting, especially project based schools. Discussion encompasses a wide array of social interaction including large group gatherings (over 6 students), mid size groups (3-6 students), small groups (2 students), formal, informal, lecture etc. Coffee houses are a building typology that accommodates these modes of social interaction very well. Coffee houses are typically quite small spaces, ranging from 1,000 to 1,500 square feet, yet



(Fig. 29) The illustration to the left is a typical floor plan of a Starbucks coffee house. The red objects call attention to the simple design methods (merchandise displays, half walls, etc.) used to separate spaces without using full height partitions. Starbucks accomodates various group sizes with such design methods. Green-large groups, blue-midsize groups, yellow-small groups

112 Fielding and Nair. 37

patrons spend hours utilizing the facilities. As one customer explained, "I frequent the joint [Starbucks] three to four times a week where I'd spend anywhere from three to 5 hours."[113] The success of the coffee house comes from the variety of seating, interior composition, and overall atmosphere. Coffee houses' interior spaces have been so successful that it has compelled places like libraries, student unions, and book stores to adopt similar types of spaces. The recognizable commercial chains of Starbucks and Caribou Coffee exemplify the building type, as grand cafés with fireplaces, comfy chairs, magazines, couches, and lots of ambience.

Personalization is a major factor in creating a flexible and comfortable space. In a coffee house, the use of moveable furniture and different types of seating allows people to customize the space. For example, the furniture can be organized to accommodate a large group of people engaging in a deep discussion, while at the same time an individual can be reading the morning newspaper in another area. This is made possible by the separation of large group seating, mid size group areas, and small group seating. Coffee houses use art displays, tables, and half walls as a means of breaking up the spaces. Furthermore, most coffee houses are equipped with a wireless internet network throughout the building.

(Fig. 30) Photo montage illustrating the application of Starbucks ambiance within a educational context.

(Fig. 31) Photo of the typical Starbucks environment

The coffee house is a great blend of casual seating, technology, dining, and

113 Nguyen, Vincent. Spending way too much time at Starbucks. http://www.vincentnguyen.com/spending-way-too-much-time-at-starbucks-2008368.php

ambiance. Schools can utilize the same characteristics to create spaces that students want to be in and that are conducive to more than one activity. For example, studios can utilize couches, lounge chairs, and coffee tables as an informal discussion area, with student work stations and tables in another area. This would allow students to break up into different activities while in the same room. In addition, wireless internet would allow students to work actively in any area.

(Fig. 32) Rowan University double height lab space

4. STUDENT TO STUDENT INTEGRATED IN DESIGN: SCIENCE LABS

Science labs are traditionally very structured and bland; however, more contemporary science labs have transformed and become more flexible and inviting. University science departments serve as some of the best examples of science laboratories, because they are institutions of invention and notorious for their intense research. The Henry M. Rowan Hall at Rowan University in Glassboro, New Jersey is an exemplary case of flexible and engaging science space. Rowan University "wanted to invest in developing a new kind of engineering education, one that would reflect the entrepreneurial spirit," as a result they created a engineering research facility focused on interdisciplinary engagement.[114]

The science labs within the school embody an interdisciplinary spirit, encouraging teamwork. The laboratories at first glance seem quite simple, yet in reality are very complex and incorporate many technical components. Each lab allows for gas, vacuum,

114 Linn, Charles. Henry M. Rowan University Hall. June 1999. Architectural Record. McGraw-Hill Companies. 153-156

and water services provided by a vertical chase corridor and horizontal trenches which carry water lines, waste lines, and electrical lines. Each vertical chase serves three labs that are stacked vertically. The horizontal trenches running within the floor system, are located in the center of each lab and under moveable partitions adjoining the labs. "Pop-off" panels are located every four feet along the trenches allowing for access to all services by the use of a "smart bench."[115] A "smart bench" is portable table, usually on casters, that is retrofitted with electrical or plumbing components and fixtures. Electrical engineering benches are typically fitted with only electrical components, whereas, a chemistry bench utilizes plumbing lines, sinks, and faucets. With all services running through floor trenches throughout every lab, "an electrical-engineering lab can be converted to a chemistry lab in a matter of hours simply by changing the benches."[116] In addition, each lab has an individual service control area where water, waste, and electrical can be turned off or on. Each lab is quite flexible on its own, but the designers found this was not enough.

(Fig. 33) Photo of Rowan University lab space

(Fig. 34) Photo of "smart bench" and access panel.

Laboratories are based on a 22 foot by 44 foot module absent of any load bearing walls between them. This allows for the lab spaces to be configured in a number of different ways, where labs can be adjoined by dismantling interior walls. The flexibility also extends into the vertical dimension. Three levels of labs are stacked on one another, but the ceilings of the sec-

115 Linn. 153
116 Linn. 155

ond and third levels can be removed. The removal of a ceiling allows for "high-bay spaces" where users can conduct large scale experiments, when needed.

The design of the Rowan University College of Engineering allows for a unique level of flexibility not often seen in a science laboratory. Portable smart benches, removable ceilings, and movable partitions allow users to shape their spaces for specific needs and take ownership of their spaces. Professors can conduct lectures and students can work on experiments within the one space. John Schmalzel, a faculty member explained, "it is ideal for the teacher and students to discuss an experiment, walk over to the lab and do it, then move back to their desks and talk about it."[117] It seems self-evident that this unique example of flexible laboratory space contains many similar characteristics to project based learning's functional requirements. Thus, the flexible design tools integrated into science lab spaces can aid in producing a project based learning studio. Furthermore, as students are expected to learn how to think and research like professionals, the spaces they work in should resemble a professional atmosphere.

(Fig. 35) Student Utilizing Presentation Technology

5. STUDENT TO STUDENT INTEGRATED IN DESIGN: ART AND PRESENTATION AREAS

Art labs and presentation space are meant to imply that classrooms must be a multipurpose space. Students must have the freedom to express themselves artistically through a diverse mixture of media and be able to display their work. Basically this

117 Linn. 155

necessitates that spaces be adaptable to large scale projects and presentation. There does not seem to be any particular building type that demonstrates art activities in specific, but many building types utilize design features that allow art activities to occur. For example, architectural studios make use of pin up surfaces and art studio spaces have large work tables for art projects. Conference rooms within offices and small auditoriums are examples of presentation spaces.

(Fig. 36) Photo montage illustrating the application of design studios within a educational context.

(Fig. 37) Lehrer Architecture Office

6. STUDENT TO STUDENT INTEGRATED IN DESIGN: LEARNING STUDIOS

In examining all of the unique spatial and functional requirements for a project based learning environment, it was found that such a space is akin to an architectural studio. The architectural studio serves as good comparison, because in everyday life architects partake in complex projects that require a multitude of different functional needs: computers, printers, arts and craft supplies, discussion areas, and presentation space. Thus, architectural studios share many of the same attributes of a project based learning environment. Obviously, architectural offices vary quite drastically on a case by case basis, but they do share many architectural design characteristics. In specific, most architectural offices are within an open layout format and each staff member has an individual work table with a computer. Monica

Ponce de Leon of Office DA in Boston, Massachusetts, explains that such a space, "allows everyone to become aware of what everyone else is doing, so that allows us to multi-task. We can very easily go from one project to another and have casual conversations, as opposed to formally leaving your office." The significance of such a statement is that it explains the fundamental goals of the space: to create a multi-purpose space, a social space, and an easily maneuverable space.


(Fig. 38)

B. STUDENT TO ADVISOR

The student to advisor relationship is arguably nonexistent in the traditional school, because teachers rarely interact with students beyond the lecture setting. In project based learning, the advisor takes on the role of mentor. Project based models are set up in such a way that students are expected to consistently interact with multiple advisors, continuously articulating the scope and purpose of students projects. Advisor's are meant to be guides for students, helping them shape the projects and lead them in the right direction. Thornburg expresses the student to advisor relationship in his Campfire metaphor. Thornburg conveys the Campfire as a space to facilitate conversation among lecturers and students. However, Thornburg's sense of the Campfire responds to the environmental considerations and does not directly discuss the impact of student to advisor relationships. This thesis explores the student to advisor relationship in a more direct fashion, exploring the social/emotional development of such a relationship and the implications on student achievement and advisory function.

Helker, Schottelkorb, and Ray explain that, "positive student-teacher relationships

help promote a pattern of continued success in student achievement while negative relationships set a course for continued school and personal problems."[118] As Sharon Babcock, a writer for the magazine, Vertical Thought, explained, "Forming sincere, personal bonds of respect with a teacher can maximize your classroom experience and life thereafter."[119] The College Student Journal conducted a study examining how such relationships impact the academic achievements of undergraduate students at Midwestern Public University. The research team utilized data from the National Survey of Student Engagement (NSSE) and distributed surveys over a three year period (2003-2005). The NSSE provided data consisting of birth year and gender. In addition the study examined students' GPA, ACT and SAT scores, which were provided by the university admissions records. The survey consisted of 29 questions pertaining to a multitude of different influences. The questions were related to "students' activities, students' course work, reading and writing, quality of academic advising, experiences that contributed to students' knowledge, skills, personal development, students' relationships with peers, faculty and administration. In addition, the survey includes information regarding gender, ethnicity, current enrollment status, and educational experiences at the institution."[120] Initially in 2003, 500 undergraduate students were selected at random from two groups, first year students and seniors, totaling 1,000 students. In 2004, 1,000 undergraduate students were selected from each group and in 2005 2,000 students from each group we used as the sample group. The average response rate to the survey over the three years fluctuated, but was overall 41.7%.

The study examined an array of predictors correlating the student achievement

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118 Helker, Wendy P., Schottelkorb, April A. and Ray, Dee. "Helping Students and Teachers CONNECT: An Intervention Model fo School Counselors." Edited by University of North Texas. Journal of Professional Counseling: Practice, Theory, and Research 35, no. 2 (2007): 33

119 Babcock, Sharon. "The Value of Student-Teacher Relationships." Vertical Thought: A Magazine of Understanding for Tomorrow's Leaders. Edited by and International Association United Church of God. 2009. http://www.verticalthought.org/issues/ym03/relationships.htm.

120 Ullah, Hafeez and Wilson, Mardell. A Students' Academic Success and Its Association to Student Involvement with Learning and Relationships with Faculty and Peers

including gender, age, and SAT scores. Significant to this thesis are the predictors establishing the correlation between student to advisor relationships and academic achievement. The study found that "students' relationships with faculty had a significant positive correlation with academic achievement."[121] The student-teacher correlation varied slightly among gender and ethnicity, but overall it has a large impact. In addition it was found that students that were actively involved or contributed to class discussion had a positive effect on academic achievement. Therefore, it was determined that student's relationships with their teachers and their interaction within the classroom considerably effected the achievement of students.

The University of Notre Dame conducted a similar study, known as the Chicago School Study, examining the influence of teachers on students' attachment to school. Maureen Hallinan directed the study through the Department of Sociology and Center for Research on Educational Opportunity. The study looked specifically at the Chicago public school system. Within the Chicago public system there are 490 elementary and middle schools and 90 high schools. The Catholic school consists of 260 elementary schools and 40 high schools. In 2002 and 2004 the University of Notre Dame 74% of the Chicago public schools and 84% the Chicago catholic schools participated in the survey distributed. The Consortium on Chicago School Reform (CCSR) believed that the schools and students whom participated in the survey, "is generally representative of the Chicago Public Schools as a whole."[122] The CCSR was able to state this because they compared the sample group to the overall population based on gender, socioeconomic status, and race, from which they held data on. This is important to note, because it demonstrates the relevance of the study as truly significant.

The dependent variable in the study was an analysis of how much students like

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121 Ullah and Wilson.

122 Hallinan, Maureen T. "Teacher's Influences on Students' Attachment to School." Sociology of Education (University of Notre Dame) 81 (July 2008): 276.

school, which was determined by questions that ask the degree of agreement (strongly disagree, disagree, agree, or strongly agree). An example of a question, "I usually look forward to school."[123] Background variables included demographic and socioeconomic data like gender and income. The predictor variables involved the student's responses to three survey questions pertaining to teachers' support. The questions were, "my teachers really care about me", "my teachers always try to be fair", and "my teacher praises me when I work hard."[124]

The results of the study show that a students' perception of teachers' support had a significant impact on students. "All three teacher-support variables have strong, statistically significant, positive effects on student's attraction to school."[125] In addition, teacher support was found to have a greater impact on student's attachment to school more than all other variables, including school safety, academic confidence, and teacher's expectations. Clearly teachers have a major influence on student's experiences at school and schools should attempt to foster student-teacher relationships. As Hallinan states, "students who like school gain significant social benefits. They become engaged in school activities that provide opportunities to develop social skills, establish friendships, learn respect for adults and peers, and engage in cooperative behaviors. These skills foster students' social developments…Students who like school perform better academically."[126]

These studies distinctly demonstrate that the student to advisor relationship is a hugely important factor in student's lives. The relationship involves the advisor being supportive and interacting with students. Thus, the architectural spaces must aid in supporting these relationships. Traditional lecture classrooms fail to create spaces that allow for students and teachers to interact on a more personal level. As Thurnburg's Campfire metaphor seems to imply, a space that supports student-advisor relationships must be

123 Hallinan. 275
124 Hallinan. 276
125 Hallinan. 278
126 Hallinan. 282

comfortable and allow for an array of activities to occur. As a result, spaces need to be accessible, comfortable, and flexible.

(Fig. 39) Google Office

1. STUDENT TO ADVISOR: PHYSICAL ENVIRONMENT

The University of California Irvine undertook a study to examine the correlation between physical environments and employee creativity. The study examined "reactions of campus-based and nonuniversity workers to relocations and renovations of their offices."[127] It was hypothesized that social climate and environmental features were a predictor of job satisfaction and perception of creativity. Conducted during the course of two years, 1986 and 1987, the study involved a sample group taken from four departments with the University and one non-university company. A survey was distributed to 250 individuals but only those that participated in both phases of the study were included in the sample group. 97 full time supervisory and staff level employees, whom participated in both phases, were utilized in the analysis. Of the sample group, 34 % were non-supervisory support staff, 36% were supervisory support staff or entry-level professional staff and 30% were supervisory professional staff.[128]

The questionnaire assessed the sample group of employees' "perceptions of support for creativity, job satisfaction, personal stress, and their ratings of physical and social features of the workplace."[129] Significant to this thesis is the correlation between social climate, environmental distraction, and creativity. Social features of the work place

127 Stokols, Daniel, Chip Clithroe, and Mary Zmuidzinas. Quality of Work Environments That Promote Perceived Support of Creativity. Creativity Research Journal. Lawrence Erlbaum Associates, Inc. 2002. 14: 2. 137-147
128 Stokols, Clithroe, and Zmuidzinas. 139
129 Stokols, Clithroe, and Zmuidzinas. 139

or social climate was measured by several questions, pertaining to the relations among employees and supervisors. Questions included, "Open exchange of ideas with my supervisor", "insufficient guidance from supervisor"," difficulties in contacting supervisor."[130] Creativity questions included, "how often do you feel creative at work and to what extent is your creativity encouraged or discouraged at work?"[131] Environmental features were examined by objective observations relating to pedestrian traffic, noise levels and sources, and visual exposure of employee work areas. In addition, research staff recorded physical dimensions of worker spaces and employees' heart rate and blood pressure.

In result, it was found that "a more positive social climate was associated with greater perceived support for creativity at work" and "a more positive social climate was associated with lower levels of personal stress."[132] Consequently, it can be said that, physical environments that promote open exchange between supervisor and employee and that make supervisors accessible to employees, significantly affect employee stress and creativity. However, it was also found that "high levels of environmental distraction [, people viewed while seated and high noise levels,] were associated with less perceived support for creativity at work."[133] The study concluded that in regard to an office setting, "physical environment and social features of work environments influence employees' job satisfaction and well being."[134]

This thesis assumes that such findings are relevant to the correlation between social climate, environmental features, and creativity within the context of schools. The dynamic among supervisors and employees is akin to that of advisors and students. Advisors take a similar role as supervisors, where they are expected to oversee others and

130 Stokols, Clithroe, and Zmuidzinas. 141
131 Stokols, Clithroe, and Zmuidzinas. 141
132 Stokols, Clithroe, and Zmuidzinas. 142
133 Stokols, Clithroe, and Zmuidzinas. 144
134 Stokols, Clithroe, and Zmuidzinas. 138

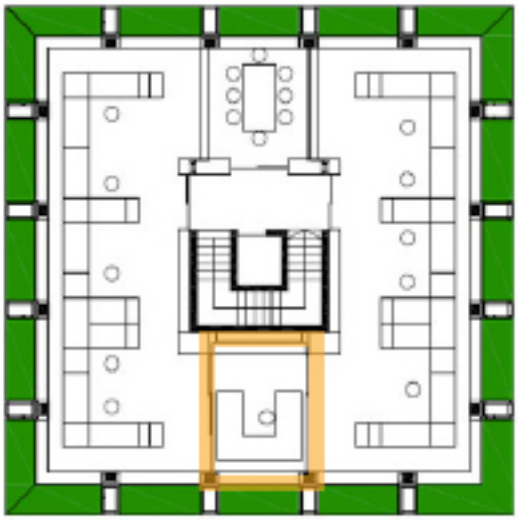
be easily accessible. So, similar to an office environment, learning communities must create a physical environment that fosters such behaviors while limiting environmental distractions. Thus, an open environment seems most appropriate for learning studios, because they facilitate interaction and accessibility. However, such spaces may also increase environmental distractions, suppressing student creativity and increasing stress. As a result, the design of a learning studio in conjunction with advisor's functional attributes must limit environmental distraction while encouraging advisor to student interaction.

(Fig. 40) Facebook office

2. STUDENT TO ADVISOR INTEGRATED IN DESIGN: CORPORATE OFFICES

The importance of student-advisor relationships coincides with the need to design spaces that foster such relationships. The space for the advisor becomes equally as important as the student space. Corporate offices are known for being quite monotonous, but some corporate office designs have stepped out of the box. The most successful offices seem to be ones that place employees together, creating environments that allow people to interact and play off one another's thoughts. However, these spaces also create individual spaces for department heads and mangers because in the everyday business

world employees need to have some degree of dialogue with their bosses. The same can be said for students and advisor relations. Students need individual space, but they also need to interact with advisors to get their thoughts. Thus, advisor offices need to be accessible and visible to students with also allowing them to have some autonomy. In addition, advisors need to be able to have dialogue with other advisors. Consequently, the advisor's office needs to be just as flexible as the student's space allowing for discussion and presentations. So the most important components of an advisor's office are accessibility and relation to the larger space, transparency, and flexibility.



(Fig. 41) Selimex Head office plan

(Fig. 42) Selimex Head office

The Selimex Head office in Latsch-Laces, Italy serves as a fine example of advisor accessibility within an open plan. The building designed by Werner Tscholl Architekt is a straightforward design created for the efficiency of the food export business. The second and third floors serve as the primary office space. The supervisor's office is located in between two open office spaces. This gives the supervisor visibility to most of the employees while ensuring that they are able to communicate with the supervisor. Furthermore, the transparency of the supervisor's office enhances the perception of accessibility and visibility.

Google and Facebook are two corporations that thrive on the innovation, creativity, and cooperation amongst their employees. The offices of these corporate giants dem-

onstrate how such qualities are integrated into design. Supervisors have their own offices, but they are integrated into design allowing for interaction. In both buildings, supervisor offices are contained enclosures which either, wrap the perimeter or are placed within the larger spaces, yet the transparency of the interior partitions creates an open and fluid space. Supervisors have autonomy from the cubicle like spaces but there is a social equality where employees are free to wander into other offices.

In the context of school design, contemporary office design can be used as a model for creating spaces that promote innovation, creativity, and cooperation among advisors and students. Advisors must be accessible and visible to students to ensure interaction while being able to supervise many students.

(Fig. 43)

C. STUDENT: INDIVIDUAL

Pedagogies of project based learning are built on the relationships among students, advisors, and the community, but it is also relies on the power of the individual. Project based learning allows students to develop their own ideas which requires deep thought and reflectance. Thornburg's metaphor of The Cave explains that a physical space must be created that allows students to work in isolation, to reflect. Thornburg explains, "Through legends and artifacts we know that, throughout the planet, learners have needed, on occasion, to isolate themselves from others in order to gain special insights."[135] As individuals, people need time and space to internally contemplate and innovate.

Much of what has been explained, in terms of student to student relationships

135 Thornburg. 3

integrated into design applies to the student as an individual. However, the considerations of the student as an individual take into account critical reflection. As Kolb explains, "experiential learning occurrs in a cycle, where reflection regarding a concrete experience leads to theorization about the meaning of the experience, which results in final testing of understandings in the world of practice through direct action."[136] In line with the Dewey, Kolb explains that for a student to complete the cycle of learning, they must relfect before applying their skills. Thus, an educational envrionment must be conducive to not only group activities, but also indiviudal experience. Gustafson and Bennett state, "The opportunity for the learner to establish an appropriate mental set for reflecting is related to the nature of the physical environment in which reflection is expected to take place. Other factors may contribute to a poor physical environment, such as competing stimuli (e.g. televisions, personal conversations, ambient noise, poor ventilation, high or low temperature, uncomfortable furniture)."[137] The traditional school environment neglects the need for such physical spaces. Accordingly, the contemporary high school should provide "caves", where one can actively reflect and enhance the learning cycle.

D. STUDENT TO COMMUNITY

The relationship between school and community is a primary component to project based learning pedagogies, where school body and the community, especially school and parents, are expected to engage one another. Thornburg's Life metaphor is the most applicable to this relationship, where students apply their skills in the context of the community. Therefore, the school must allow for students to interact internally and externally to the school. The inclusion of community members-parents, professionals, and the

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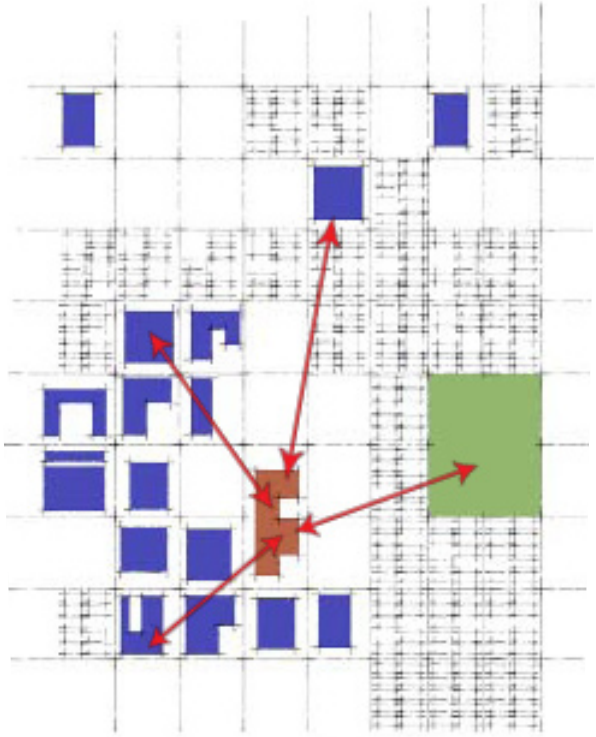
136 Zimmerman, S., Hanson, D., Stube, J., Jedicka, J., and Fox, L. Using the Power of Student Reflection to Enhance Professional Development. The Internet Journal of Allied Health Sciences and Practice. April 2007. 5: 2. 1-7

137 Gustafson, K. & Bennett, W. (1999). Issues and Difficulties in Promoting Learner Reflection: Results from a Three-Year Study

overall public are the key to developing a true community school. Thus, the aim of the school should be to attract and involve all such groups by any means possible. Nair and Fielding explain that a school "connected to the community" exhibits three aspects: 1) a location close to the heart of the community 2) ties to the neighborhood by way of business relationships and amenities for the community 3) "the way the school is designed to be a welcoming place for the community."[138] Accordingly, a designer can directly aid in facilitating community engagement by articulating the building envelope, commons or lobby space, and the entry in such a way that communicates a welcoming and interactive sentiment. As illustrated earlier, traditional school buildings have failed to produce such a response. Therefore, the project-based model must depart from conventional means of community integration.

1 A LOCATION CLOSE TO THE HEART OF THE COMMUNITY

The location of the school has a major influence on how students and the community interact. As Nair and Fielding explained, the school has greater potential to connect to the community if it is situated in close proximity to the heart of a community. A study conducted by the Department of Geography at the University of Western Ontario explored the influences of the physical environment and socio-demographic characteristics on student's mode of travel to and from school. Significantly the study examined mode of travel in comparison to distance



(Fig. 44)

138 Fielding and Nair. 87

from school. Although the study was used as means to examine student's physical activity in relation to proximity to schools, the study also demonstrates how schools within close proximity can increase student's engagement with their community. As this thesis asserts that high schools should be community based schools, serving local neighborhoods, this study illustrates the importance of proximity.

From October to December in 2006 and April and May of 2007, 810 seventh and eighth grade students from a midsized Canadian city, London, Ontario, were surveyed. The study examined many variables that may influence student's mode of travel to school including socio-demographic data like gender, age, parent's educational attainment and income. In addition, physical attributes of the neighborhood and school neighborhood like street trees, intersection density, sidewalk length, and land use mix. All data was validated by researchers through physical observation and Geographic Information System data collection.

Of the students "nearly two thirds of students (62%) living in 1.6km [just under one mile] of their school used a form of nonmotorized (active) travel to get to school… the vast majority of this group walked (95%). "[139] It was found that of all the influencing variables, distance between school and home was the most significant factor in predicting whether a student used nonmotorized forms of travel to get to school, although boys were more likely to walk to school. In addition, it was found that "as residential density increased, the probability that a child would walk to home from school decreased."[140] Thus, it land use mix is an important factor in promoting student's nonmotorized travel to school. As the study explained, "these findings have implications for decisions regarding the siting of schools, planning and management of the urban environment."[141]

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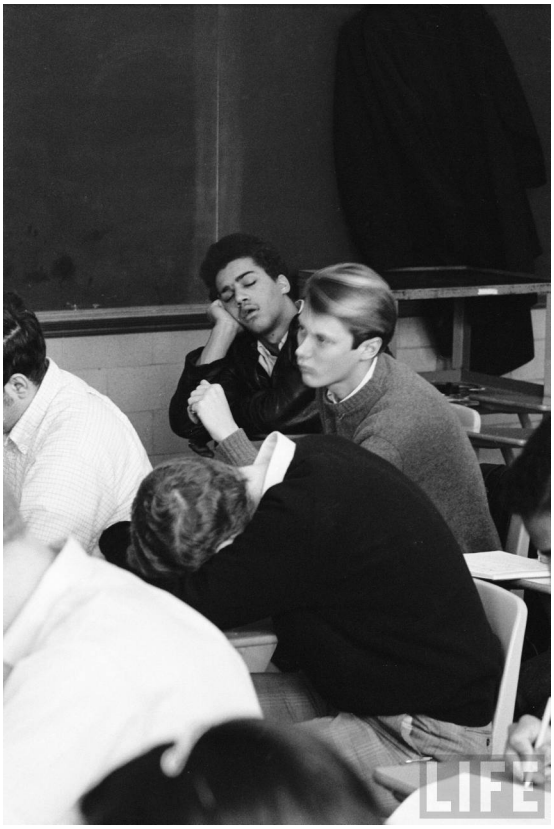
139 Larsen, Kristian, et al. The Influence of the Physical Environment and Sociodemographic Characterisitics on Children's Mode of Travek to and From School. 523
140 Larsen, Gilliand, Hess, Tucker, Irwin, and He. 524
141 Larsen, Gilliand, Hess, Tucker, Irwin, and He. 523

In the context of this thesis, the findings articulate the need for community schools within close proximity to student's homes and around a mixture building uses. Thus, inner city residential areas near various resources offer great locations for high schools; however these areas have been neglected in favor of suburban areas. The Milwaukee Public School system has moved away from community schools with the introduction of the school choice initiative. This has broken the community culture, because students no longer circulate or travel within their own communities. As the University of Ontario's study demonstrated, locating schools within communities will encourage students to walk to school. If students have a community school with additional resources, communities can begin to reconnect. Thus, a school in close proximity becomes more accessible to students and may serve as a catalyst to increase parents motivation to visit their student's school.

2 TIES TO THE NEIGHBORHOOD BY WAY OF BUSINESS RELATIONSHIPS AND AMENITIES FOR THE COMMUNITY

A. SERVICE LEARNING

As Benjamin Franklin once said, "Tell me and I forget. Teach me and I may remember. Involve me and I will learn."[142] "The Silent Epidemic: Perspectives of High School Dropouts" reported that 70 percent of the students surveyed reported that they "did not see the real-world applications of their schoolwork ... and nearly half felt bored



(Fig. 45) Life Magazine

142 Ben Franklin

by their classes."[143] From the same study more than 80 percent of students believed that schools should provide real world professional opportunities like internships, work studies, and service learning. Thus, high schools should be offering such programs. The "Engaged for Success" study reported, "seventy seven percent of students in service learning programs, and 66 percent of at-risk students who did not participate in service-learning programs, say that service learning had or would have had a big effect on motivating them to work hard."[144] Overall the study found that high schools believed service learning would motivate them, make school more interesting, and enhance their education. The misconception of service learning programs is that students are volunteering their services, solely at the benefit of a private business. However, service learning is a creative blend of academic structure and professional development. Prentice and Garcia explain that service learning offers a wide range of benefits to all parties.

> "Benefits to students include access to career exploration opportunities, enhancement of interpersonal and human-relations skills and enhanced academic learning. Benefits to faculty include having access to another teaching tool with which to meet academic objective of the course, providing another method for professional development, and offering another vehicle to address students' learning styles. Benefits to community agencies include having motivated students on-site providing much needed work, and an opportunity to increase services provided to clients."[145]

The obvious benefit for businesses is that they obtain a free set of hands for several hours during the week. However, this also makes schools accountable for students, because businesses do not want to teach students from scratch. Thus, the student, advisor, and business need to work together.

The study conducted by the College of Communication and Information of the University of Tennessee explains the implications of internships on student's future

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143 Bridgeland, John M., DiJulio, J., and Wulsin, S. Engaged for Success: Service-Learning as a stool for High School Dropout Prevention. Report. Civic Enterprises. April 2008. 1

144 Bridgeland, DiJulio, and Wulsin. 2

145 Prentice, Mary and Rudy M. Garcia. "Service Learning: The Next Generation in Education." College Journal of Research and Practice (Taylor & Francis) 24 (2000): 19

decisions within the public relations major. A total of 319 undergraduate students enrolled in a 1-credit public relations internship course served as the sampling group. The study took place over 3 years, between spring 2002 and fall 2004 semesters, include three summer terms. After completion students were given the survey. The subject areas within the study relevant to this thesis were: 1) "the perception of how beneficial their contributions are" 2) "perception of the value of their contributions", 3) Pre- and post-internship information in terms of career plan. "how much their choice of the internship site was influenced by their initial career plans. "rate how much of an influence their internship experience has had, now that it has been completed, on changing their career plans."[146] The study is relevant to this thesis because it explains how students perceive the impact of their internships.

The study found that "the more students are able to use what they have learned in class during their internship significantly influences how valued they feel about their civic engagement contributions."[147] If students are able to apply their skills within a professional environment, they feel valued. In addition the data showed that "the more students are able to use what they have learned in class during their internship influences students' choice to change their original career paths."[148] This shows that internships give students the opportunity to decide if the profession is right for them, giving them a head start. The data also showed that "the more students are able to use what they have learned in class during their internship significantly influences how much they believe the various publics are benefiting from their civic engagement contributions."[149] Thus, the more students get into the real world, the more benefits they seen in the work they are doing. From this study it can be said that internships help students appreciate their profession and the impact they can make. This thesis does take into account that the study is focused on a

146 Fall, Lisa. "Value of engagement: Factors influencing how students perceive their community contribution to public relations internships." Public Relations Review (Elsevier Inc.) 32, no. 4. 409
147 Fall. 410
148 Fall. 412
149 Fall, 409

single career field and the data cannot be assumed to be accurate in articulating the appropriateness of all internships. However, it can be assumed that introducing student's to their career interest will help them decide if their career field is right for them, no matter what the career.

Professional opportunities for students through service learning, as shown by the research, clearly demonstrate the need for high schools to reconnect with their communities. In addition with increasing pressure on the U.S. Department of Education and state departments to expand service learning, schools of the future must be able to facilitate such programs. High schools can serve a primary role in readying students for the professional world.

B. COMMUNITY CENTER

Beyond the need to increase professional opportunities for students, there is also the need to create resources that parents and the larger community can utilize. Traditionally, high schools were community institutions supplying communities with informationl resources. However, community centers have recently taken on the role as information repositories and digital resource for the public. To increase the usefulness of school facilities and engage community members, high schools need to modernize and provide contemporary resources. Thus, this thesis explores the opportunity to blend the programmatic elements of community centers and schools. Such a union is meant to reestablish the high school as a community institution, providing usefull resources and engaging everyone in a common goal-education. In today's world this means providing digital resources.

Many cities have realized that many low-income residents wish to advance their education, but lack the resources to do so. It is estimated that less than 20 percent of

housholds in the central city have home computers.[150] Consequently, across the nation cities are pushing initiatives to create community technical centers with aim to increase digital literacy, improve employability, and enhance civic participation. Community tech centers (CTC) usually include "access to computers and the internet and may include or be linked to other community network technology services such as web or email hosting."[151] Different than a traditional library or community center, CTCs provide tutorials and classes, actively educating patrons. In addition, CTCs provide the public an opportunity to volunteer as employees or rent out space for special community activities like workshops. Seattle has served as the leader in CTC creation frequently updating the resources within their facilities.

In developing an expansive network of CTCs, Seattle has analyzed the success of the program, collecting data on users utilization and rating of the program. The data was executed by the use of a survey. Weekly counts showed that on average, a user visits 14 times during the year, resulting on an estimated 1,392,538 visits per year. In addition, 24 percent of surveyed users indicated they used the center seven hours or more per week and 88 percent indicated that they would continue to use the CTC.[152] The results demonstrate the usefulness of providing such a resource. If given the opporunity, residents will actively use such facilities.

As this thesis is pertinent to the inner city context, a CTC could provide residents with a much needed resource. Often, parents within the inner city lack higher education or even any digital skills, thus widening the gap between student and parent. CTCs as digital and information resources could help bridge the gap between students, parents, and education, involving the public within the mission of higher education.

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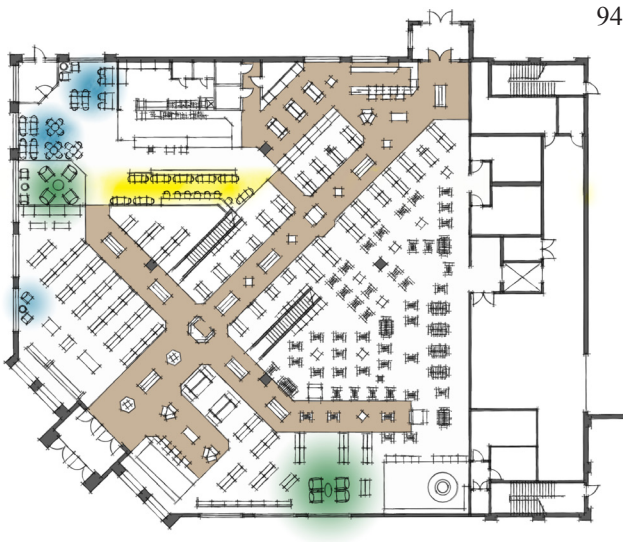
150 Milwaukee Department of Administration. Milwaukee Digital Inclusion Program. City of Milwaukee February 2007. http://www.city.milwaukee.gov/Background20654.htm#Q1.
151 Milwaukee Department of Administration
152 Milwaukee Department of Administration

3 "THE WAY THE SCHOOL IS DESIGNED TO BE A WELCOMING PLACE FOR THE COMMUNITY."



(Fig. 46) Typical floor plan of Barnes and Noble. Showing seating situated on perimeter, as a form of advertisement

The school design should activate a neighborhood by creating a welcoming and exciting environment. Transparency of the envelope is one major design tool of articulation that can achieve this activation. Street fronts of commercial businesses clearly illustrate that transparency into a building creates more interest and activity. Clear visibility of the interior spaces allows the public to view students and teachers, thus invoking a response of interest. In addition, transparency raises the level of natural surveillance, where the school and the public can observe each other. Moreover, what is happening in the visible space becomes of great concern. Accordingly, the visible space should have a public function, where the public can physically engage with whatever is happing in the building.

There are a plethora of examples demonstrating transparency, public incitement, excitement, and visibility but the contemporary book store is a great instance of all attributes coming together. Barnes and Noble and Borders are two corporations that have embraced these characteristics and designed buildings that engage people from all walks of life. The architectural articulation of the envelope and design of the interior space are the most notable components. The exterior skin is typical of any commercial space, maintaining as much transparency as possible, however the combination of program and transparency create an exciting and interactive street front. The book store acts much like a school commons should, where people can socialize, partake in group discus-

sions, and have individual work time.

The advantage of encouraging the public to enter a building is that it creates frequent patronage and promotes new customers. Within an educational usage, the school should be encouraging new and old community members to utilize the facilities. The perception of safety and security has forced many schools to close off schools from the public during regular business hours. As a commercial business, books stores allow for large crowds, yet they manage to allow people in and out without difficulty. This is made possible by control points at the entry ways.

Advertisement, including media displays and comfortable seating are used to attract people to go in. Figure 48 demonstrates how the transparency of the exterior envelope allows the public to view the activities occurring; people reading, listening to music, and drinking coffee. Thus, not only do the display of books, music, and magazines entice on-lookers, but also the people inside draw in others. However, these book stores have become more than just stores, they have become social hot spots, where people meet up to have coffee, authors give special lectures, and college students go to have study sessions.

As a school, the components designed for book stores can translate to a more publicly inviting and energetic space. Similar to the coffee house, the organization of the

(Fig. 47 Right) Photo montage illustrating the application of Barnes Noble within an educational context. (Fig. 48 Left) Photo of typical Barnes and Noble exterior

space and the furniture are most applicable to school design. The interior spaces of a book store utilize shelves and product displays to separate space, instead of full height partitions. This separates areas without compartmentalizing spaces.


(Fig. 49) Milwaukee Area

VI. CONTEXT ANALYSIS

The contemporary status of inner city high schools and the educational system is in deep decline. Inner cities deal with poor infrastructure, lack of affordable housing, and high unemployment rates leaving the children who live in these areas to suffer the most. Educational facilities should be a place where students can feel safe, have a sense of belonging, and be involved in communal activities. In the past, high schools were the main institutions that promoted such beliefs. Schools have become detached from their community because of the lack of interest in creating better schools and decreased value in education. Lack of funding is believed to be the primary reason for the decline in proper school environments, but with the recent advances and research in affordable materials and construction techniques, lack of funding can no longer justify poor educational facilities. Advances in technology and architectural design should be used to not only improve school facilities, but to also improve the lives of students and their surrounding community. As a result and as it has been proven, improving the education of children decreases the percentage of children who remain in poverty and become involved in criminal activity.[153]

153 Lochner, Lance. "Education, Work, and Crime: Theory and Evidence." Rochester: Univeristy of Rochester, September 27, 1999.

In the past few decades, inner city high schools have become places of violence, vandalism, and low enrollment. The condition of the public educational system is quite appalling and the Milwaukee Public School system serves as a distinct example. The Milwaukee Public School (MPS) System in Milwaukee, Wisconsin is an example of a public system within the inner city. Inner city Milwaukee is composed of residents whose income is barely one-third of the metro area average, persistent racial segregation, and neglected neighborhood infrastructure. While some define certain zip codes of Milwaukee as central city, UWM Center of Economic Development states "'central city' has a precise meaning, defined by the U.S. Bureau of the Census as the (entire) city, as opposed to suburbs or metropolitan areas. Consequently, academic researchers use the label of 'inner city' or 'ghetto' to describe the troubled neighborhoods of the 'urban core.'"[154] MPS tried a quick fix by busing a small percentage of inner city youth to suburbs outside the city known as the 220 program. Being one of those students when I was in elementary school, I know firsthand that these suburbs are given better facilities. I received a great education from the opportunity of the 220 program, but others were left to receive a lesser education in the inner city school system. MPS system is based in the traditional high school architectural model. The institutional, sterile, and lack of motivational spaces are the primary reasons students find a lack of interest in these schools. By adapting contemporary knowledge of innovative architectural design, high schools can be vastly improved.

Milwaukee is the largest city in Wisconsin and is the 25th largest in the country. The Milwaukee Public School system is the major public education body in the city and is one of the largest in the U.S. MPS has been in decline for the past two decades due to low enrollment rate, lack of attendance, decreased community involvement, and greater concerns in safety. In an article from the Milwaukee Journal Sentinel, Borsuk states,

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154 Levine, Dr. Marc V. *The Economic State of Milwaukee's Inner City.* College of Letters and Science, Univeristy of Wisconsin Milwaukee, Milwaukee: UWM Center of Economic Development, 2006, 1-43.

"enrollment will be below 80,000 students for the first time in decades." The enrollment projected will be 20% lower than it has been in the last 10 years. MPS has tried in the past to mitigate this problem by offering alternatives to affiliated Milwaukee public schools, like charter schools and school vouchers. In addition, MPS has also created a desegregation program which involves displacing inner city students to schools in suburban areas. The program was characterized as an effort to promote a more diverse student culture, but the program only buses students in one direction. If this was truly an effort to desegregate Milwaukee schools, there should have been measures taken to create an equal exchange from the suburbs. The program was only covering up the main issue, which is the lack of quality educational facilities in the inner city. Provisions have also been put in place to offer city students private school vouchers which displace students from schools in their area to better suited educational environments. California Superintendent Bill Honig explained it the best when he wrote, "What the nation should be discussing is how best to […] accelerate reform-not how to dismantle public education."[155] This is important to note because MPS is a system that is in great decline, but with the right tools the system can be fixed. There are many attributing factors to the fall of the MPS system. Through the implementation of architectural principles, Milwaukee Public High Schools can become just as good as suburban facilities, if not better.

The architectural status of Milwaukee Public Schools is in the same condition as it was 20 years ago. The formal institutional masonry block form with dark, narrow corridors and unmotivated architectural design describe the buildings character. Small punched openings in the exterior bearing walls, in some cases with bars on the windows, evoke the feeling of a prison like building. Funds have been given to Milwaukee schools in an effort to improve facilities by way of new furniture, computers, and sports supplies. Without appropriate architectural design to motivate students, these monetary improve-

155 US Census Bureau. "Census 2000 Data for the State of Wisconsin." *United States Census.* April 1, 2000. http://factfinder.census.gov/servlet/QTTable?_bm=y&-geo_id=04000US55&-qr_name=DEC_2000_SF3_U_DP2&-ds_name=DEC_2000_SF3_U (accessed April 2, 2008).

ments will be of little assistance. Another attributing factor to the lack luster school environments is the adaption of safety measures. Many schools are riddled with vandalism and student violence, but all schools deal with similar problems. Safety concerns are motivated by the rise in school violence in the last decade, but there are alternatives to gates, metal detectors, police patrol, and security. Milwaukee Public High Schools are in need of a new formula, architecture can create a more student supportive environment.

(Fig. 50) Riverside High School

A. MILWAUKEE PUBLIC SCHOOLS

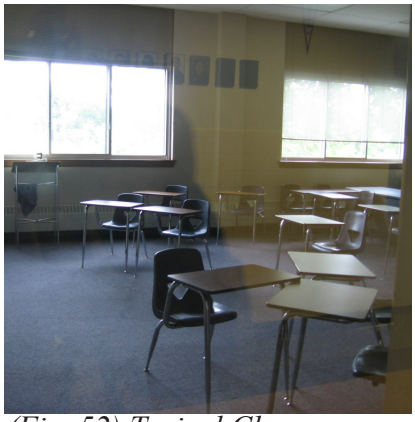
In developing a new model for high school education it was important to survey current educational facilities. Bearing in mind this thesis is city specific, the examination of nine educational buildings took place in the project region, Milwaukee, WI. Although, most of the field study was focused on MPS schools, there was an effort to explore alternative educational systems i.e. private schools and charter schools. Nevertheless, private, charter and public schools hold true to a conventional building environment because they are all vested in traditional instructional methods. The facilities examined include the Milwaukee School of the Arts, Riverside High School, Malcolm X Academy, Roosevelt Middle School, Roosevelt Metropolitan High School, the Walker Multiplex, Daniel Webster Middle School, Messmer High School (private), and Bradley Tech. Bradley Tech is a newer facility and departs from the traditional model, as a result this school was given more attention and is analyzed in further detail as a case study. In exception of the Bradley Tech School, all of the other schools share the typical components of a traditional industrial age building. Consequently, the exploration of most of the schools is concerned with

the architectural articulation of the exterior envelope and volumetric layout. However, to illustrate the monotony of such traditional facilities there is some imagery displaying the inner workings of the schools.

The physical state of Milwaukee schools is typical to most cities, clinging to traditional education buildings. Thus, the durable and monolithic features of traditional schools are carried throughout all of the facilities. Although, some of the schools included are not high schools, all of the schools can be viewed as comprehensive schools. Comprehensive in this sense is meant to explain the all-inclusive nature of traditional schools, providing all the school's functional needs under one roof. As the Wisconsin climate is known for its long, cold, and snowy winters, the schools are all-encompassing structures. All spaces are encapsulated by an exterior envelope, with all programmatic functions linked internally by hallways and stairways. Materials of the envelope are characteristic of Midwestern architecture including masonry and concrete. The focus on efficiency, typical of traditional education, is expressed by the repetition of windows punched through the exterior structural walls.

(Fig. 51) Messmer High School

Schools are meant to be community buildings allowing interaction with the community, thus the entrance becomes an important feature. The stark masonry bearing walls, although durable, make for an unwelcoming and unapproachable building. The main entry points of Riverside High School (figure 50) and Messmer High School (figure 51) demonstrate the standoffishness of current schools. The entry is distinctively different because it is raised off the ground


(Fig. 52) Typical Class

by a stairway and juts out into the sidewalk. So although the entry is pronounced, the simplistic and barren treatment acts in conflict. The small doorway, lack of an overhang, and opaque materiality convey an unfriendly feeling. Furthermore, the sheer monumentality of the protruding entry block intensifies the perception of institutionalism. The monumentality of the schools acts as a wall to the community like it's a fortified building.

Upon entering the educational fortress, students travel down double loaded corridors which have little to none natural light. Lockers line the hallways which lead them to their isolated, self contained classrooms. Visibility to the exterior environment is selectively provided by fixed frame windows lining one wall. The classrooms are typical of the traditional school model with rows of desks and a chalk board at the front of the room (see figure 52 & 53). There are no accommodations for group work, discussion, or applied skill activity.

While many Milwaukee schools are architecturally inadequate, some schools have adopted new means of furthering the education system. Throughout the field study two such schools, Messmer High School and School for Urban Planning and Architecture, exemplify this attempt to modernize. At Messmer High School, Brother Bob Smith is the acting president of the highly successful private Catholic school that serves K4-12 students within Milwaukee, by way of four school sites. Serving just over 1400 students among the four campuses, Messmer Catholic Schools offer a small school atmosphere. Messmer High School serves 640 inner city students from 9th-10th grade where 85% of graduates go onto college. Br. Bob explained

(Fig. 53) SARUP Classroom

that the relatively small school size is to create a school where "you know the students' name" and "there is sensitivity to the neighborhood." Br. Bob asserts that the small student population is essential for creating an atmosphere in which students feel comfortable. In addition to the small population, Messmer enforces a uniform code serving a specific purpose. The uniform puts less stress on students' attire allowing students to focus on their education.

The need to address concerns and problems outside the schools walls required Messmer High School to move beyond typical school practice. In response to such problems, they offer Saturday school which is a voluntary program to help students. Marquette Mothers Association goes to the school to tutor and aid in career information and financial aid. Due to the schools location, the site does not have enough space for outdoor extracurricular sports which forced the school to think outside the box. Messmer High School was the first school in the nation to create a sports coop between a public and private school. The coop not only helped the schools offer students that chance to compete in football, but it also brought suburbia and inner city students together.

The School of Urban Planning and Architecture (SUPAR), founded by Dr. Kirk Harris in 2006, an instrumental charter high school within the inner city of Milwaukee, WI. In partnership with the UWM School of Architecture and Urban Planning, SUPAR is a project based curriculum providing students with community awareness. The school is located in an existing MPS building with two other charter schools. SUPAR utilizes the basement floor which contains all the schools programmatic needs like classrooms, cafeteria, bathrooms, library, etc.

As a project based school, teachers utilize projects to guide students rather than lecturing them. The projects are meant to intertwine different components of the usual curriculum like math and science, but focus on a student's interest. The projects do not necessarily have to be urban planning related; however, they must challenge the

students in all the core areas. Dr. Harris believes that the traditional environment does not offer the enriching experience that comes from project based learning.

There is no principal so the school faculty operates as cooperative where teachers assume more responsibility and roles. Teachers act as administration, accountants, and counselors. Coupled with the small student population the engaged staff create what seems to be a strong school culture. The one on one attention that students receive is helpful, because many of them are students that were struggling at other schools. The plentiful supply of technological resources gives the students even more reason to work hard.

VII. PROJECT SITE ANALYSIS

1. SITE

The project site is located at 1017 N. 12th Street in the Near West Side of Milwaukee, Wisconsin, just outside the downtown area. The lot is made up of two city blocks

(Fig. 54) Aerial of project site and primary resources: Marquette University, King Park, Milwaukee Public Library etc .

bordered by Highland Ave. to the North, State St. to the South, 12th St. to the East and 14th St. to the West. The site currently contains the Sara Scott Middle School of Health and Sciences, but has been mothballed due to the expansion of charter school development. Due to the recent surplus of Milwaukee Public School facilities the district has proposed to sell the site. The site is considered a valuable asset due to its proximity to the downtown area and future plans to develop the area.

At approximately 217,000 sq. ft. the site is a mid-sized lot. The proximity to dozens of valuable educational resources makes the site a prime spot for educational services. Marquette University, the Milwaukee Public Library, Medical Center, Harley Davidson, Federal Courthouse, and King Park are just some of the available resources within 1mile. The diversity in public resources opens the opportunity to connect the high school with technological, athletic, and business resources. With 981 businesses located in the area there is great potential to connect students with businesses for internships. The public bus offers easy travel, with 12th and Highland being primary bus routes. Residential is primarily located to the north and west of the site. Buildings belonging to the Medical Center border the South and East sides.

In 2004 the City of Milwaukee adopted the Near West Side Comprehensive plan with the purpose to "create a place where people can live, work and play in a safe, clean and inviting community." In addition, the plan is meant to be in accordance with cities comprehensive plan of "smart growth" strategies. The plan outlines strategies to increase a mixture of residential uses and the density. Furthermore the plan describes an area which will serve all the needs of the community with grocery, commerce, and public resources. In that plan the site was envisioned to stay as an institutional lot.

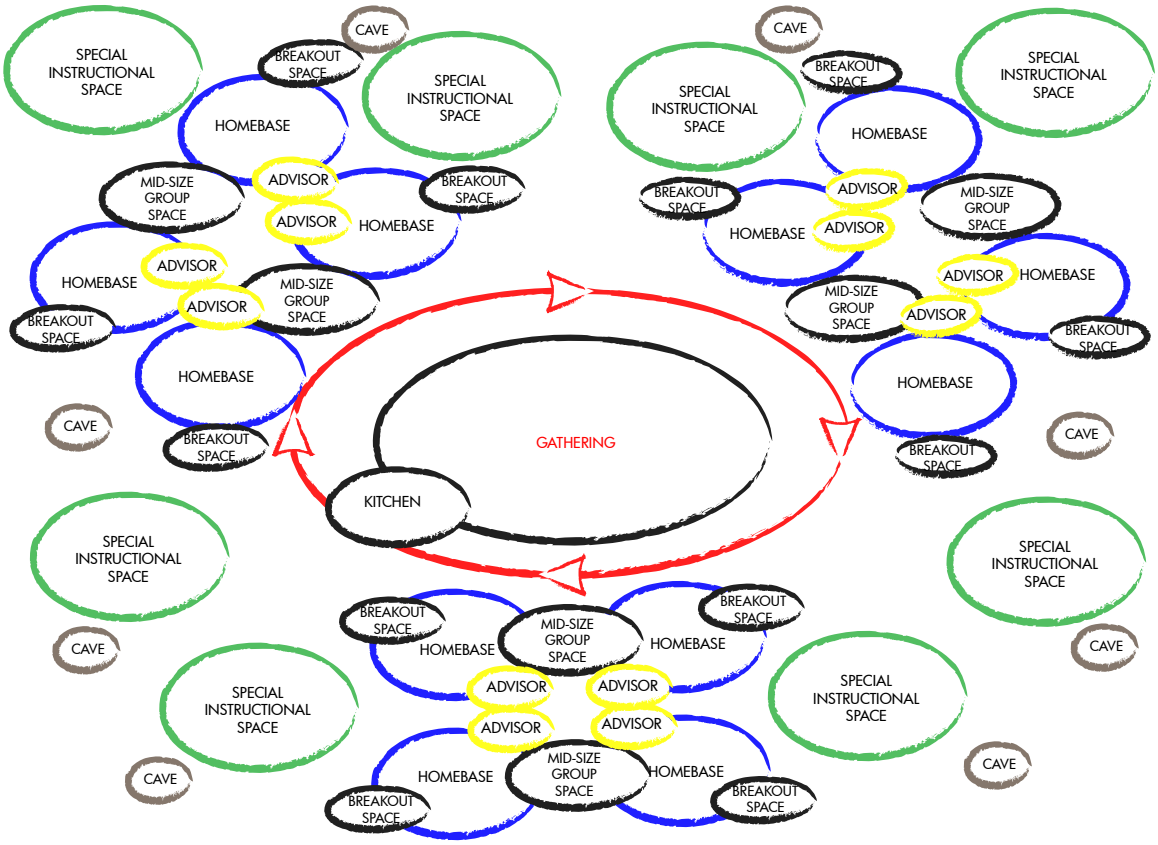
At the time the Near West Side had a total population of 30,728 with a median age of 23.2 years. The large population and plans to increase single and multi-family properties create a great opportunity to invest in public institutions. 65 percent of the

population is of a minority or Hispanic, but the residential areas nearest to the site are primarily African American.

The mid-sized site is relatively small for a high school, but the availability of resources means that not all resources must be offered on sight. The large public park could be utilized for after school extracurricular sports like track and field or football. Marquette University's library and the Downtown Public Library, which are within a half mile, allow for a minimized supply of books.

2. WEATHER/CLIMATE

As a seasonal climate, the Milwaukee area receives a range of temperatures and weather conditions throughout the year. The averge annual temperature for Milwaukee is 46.1 degrees Fahrenheit with an average of 9 days per year reaching a maximum temperature over 90 degrees. Most significant is the winter season, with an average of 137 days with a minimum temperature below freezing and average monthly snowfall of 47.1 inches. Collecting heat during the winter months would help to save energy costs; however, during the winter, there is limited daylight, reaching approximately nine hours on the winter solstice. Wind is rather minimal with average wind speeds of 11.5 mph. Summers become rather humid, so it is important to utilize passive cooling systems to cool a structure during the summer months. The site itself holds many opportunities to use passive environmental controls, because the longest sides of the property are along the north and south.


SPECIAL INSTRUCTIONAL SPACE
CAVE
BREAKOUT SPACE
HOMEBASE
MID-SIZE GROUP SPACE
ADVISOR
GATHERING
KITCHEN

VIII. PROGRAM

The project based learning model is a unique student centered approach giving students freedom to explore new avenues for learning, thus the program should be the instrument that facilitates the innovative approach. In line with the three major relational components of the suggested educational model- student to student, student to advisor, and school to community- the program attempts to cultivate such relationships. The school program embodies the sense of sustainability, through flexibility and longevity, to allow the school to fluctuate with changing educational needs. The school will be organized into four distinct learning communities which can operate independently of one another as needed and can operate as one entire learning community. The school will be expected to serve a maximum of 720 students, inclusive of the four learning communities, with 52 faculty members.

A. LEARNING COMMUNITY

The learning community can be considered as a school within a school, which is comprised of three advisories. Each advisory consists of four advisors with a group of a maximum of twenty students. An advisor with a group students will be contained within a learning studio. Organizationally, learning studios will be situated in close proximity each other to allow the four advisors and students to engage one another. The learning studio serves as the primary functional component of the school, acting as the major learning space. The learning studio is the homebase, where students have individual storage at their desks, thereby eliminating the need for locker space. Learning studios are multipurpose spaces which allow for a wide range of activities such as lectures, group discussion, and individual work. Housed within the learning studio are individual desks with storage and the advisor's office. The break out space is left outside the studio to isolate group activities during studio time. Due to the nature of project based activities learning studios at 1,200 sf are larger than a typical classroom.

To create more opportunity for students and advisors to work in collaboration and socialize, a team room at 1,000 sf is provided in each advisory. The team room acts like lounge, offering a space for informal discussion and group activity among learning studios. Project based learning requires that advisors work together to plan, execute, and revise student project plans. Therefore, team rooms are provided to make advisor collaboration easier and more frequent. Including a team and four learning studios, an advisory is 5,800 sf.

B. SPECIAL INSTRUCTIONAL SPACES

The diverse nature of the project based model necessitates the need for a diverse mixture of supplementary special instructional spaces for learning communities. These supplementary spaces including laboratories, media labs, kitchens, and assorted discussion spaces will be shared by the three advisories in each learning community. Based on a typical multi-purpose science lab, allowing for a mixture of wet and dry experimentation and projects the lab will be 1,250 s.f.[156] Supplementary spaces, like the labs, can be utilized by whole learning studios or by individual students. In addition, the larger supplementary spaces allow advisors to coordinate on learning agendas to teach subject matter in groups, if needed.

With the specialized program geared toward advancing the functionality of the school for project based learning, the school will also provide programmatic elements beneficial in other ways. Often project based learning schools focus on solely academic achievement; yet this thesis recognizes the need to provide resources that help students develop in other areas like the arts, music, and physical health. However, this thesis also identifies the need to offer programmatic elements, in regard to the arts, music and physical fitness, that move beyond the typical educational model. Repeatedly, public physical education programs focus on sports, neglecting the need for spaces that promote overall

156 Sheldon Laboratories. 2009. http://www.sheldonlabs.com/lab_planning_pier.htm.

health and physical fitness. The Palo Alto Medical foundation reports that, "among children and teens ages six to 19, 15 percent (almost 9 million) … or triple what the proportion was in 1980. In addition, the data shows that another 15 percent of children and teens ages six to 19 are considered at risk of becoming overweight."[157] Therefore, schools must include fitness programs and innovative functional spaces that promote healthy living. Fielding and Nair explain, "Student "gyms" need to look more like adult physical fitness centers so that students are more likely to develop healthy, lifelong habits."[158]

To rectify this, a learning community will be provided active spaces that are suitable for yoga, dance, aerobics, and martial arts. Like the other special instructional spaces, each learning community will contain two active spaces at 1,050 sf, which will be shared by the entire learning community. Active spaces can promote a more complete physical fitness regimen. Each learning communtiy will contain a small kitchen with cafe seating at 1,000 sf, allowing faculty and students the opportunity to bring lunch to school. Furthermore, the kitchen and cafeteria spaces can double as educational spaces for learning about healthy eating habits and physical medicine.

To encourage music education, each learning community will contain one practice room to allow learning communities to hold smaller music classes. Students interested in music education will be provided with practice rooms at 1,600 sf. Lastly, to encourage exposure to professional atmosphere presenation space is dispersed throughout each learning community. A larger and more open presenation space at 1,000 sf and three conference rooms at 525 sf each conclude the learning community program.

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157 Palo Alto Medical Foundation. Health Problems: Teen Obesity. February 2009. http://www.pamf.org/teen/health/diseases/obesity.html.
158 Fielding and Nair. 44

C. ALL SCHOOL PROGRAM

As the site has been intensified by clustering four learning communites the school will have large program elements typical of larger comprehensive high schools. All larger program features are located on the first level to encourage public use and movement throughout the facility. A gymnasium at 7,000 sf with locker rooms at 2,500 sf, a weight room at 3,000, and a rock wall at 700 sf round out the physical education component, promoting daily physical fitness. A larger cafeteria at 2,500 sf and full kitchen at 1,300 sf is provided, as "84% of public school students are eligible for free lunch at school."[159]

A construction lab of 1,500 sf, kiln room 400 sf, and manufacturing lab at 1,500 sf is provided for those students interested in carpentry or the arts. Art and construction students utilize similar tools and media, thus the formentioned programmatic elements are suitable for the art related projects. An 800 seat auditorium at 11,000 s.f, will offer students a venue for performances and provides a large space for the entire school to meet. However, the auditorium is containted within the commercial buidling block, so that it may be rented by public parties while it is not in use by the school.

The administration program includes space for the school director at 250 sf, file storage of 350 sf, and administration employees 600 sf. A primary purpose of the administration space will be for security purposes, controlling who enters the building. Advisors within the project based model take on the role of administrator, thus the administration program is limited. Organizationally the administration will be located near the main entrance to maintain natural surveillance and will also contain the waiting area at 200 sf. Lastly, a nurses office with restroom is provided at 450 sf.

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D. COMMUNITY TECHNOLOGY CENTER

In creating a more community integrated high school, the school will have an additional community center program to provide a useful public resource and activate the school environment. All spaces in the community center are to be used by both the school and the larger community. To maintain security and safety during operational hours the community center will have a control area in addition to a tech center manager's office of 120 sf, as to control patrons and students who enter the building. The community center program will aim to enhance digital literacy, accessibility to employment resources, health care information and public inclusion in the educational system. The community center will provide such opportunities by way of a technical center of 4,800 sf, providing computers and printers. Such resources are needed because it is estimated that less than 20% of households within the inner-city have home computers and the unemployment rate is at 13%.[160] Contemporary resources like magazines, books, and CDs within the tech center will enhance the public's use of the schools' facilities, further integrating the school and the community.

In addition, the community center block will contain a the library at 4,800 sf, on the secion level, serving both the student population and the community. A photo lab at 700 sf will be loaction on the library level. Finally, the third level of the community center block contains the counseling center at 4,800 sf, which includes a parent center, career center, and school counselor offices. School counselors are expected to help the students as well as parents. Informational resources like the career center and parent center are to provide parents, students, and other community members with an opportunity to access information about the school and the larger community. The two upper levels of the community center also contain public work rooms at 1,500 sf. The work rooms can serve as conference and multipurpose rooms which will afford parents the prospect of engaging

160 Milwaukee Department of Administration

advisors, other parents, and students. In addition, these spaces can be reserved for community events and outreach classes for the public.

E. OFFICE SPACE

As this thesis is interested in developing an inner city high school program, the program includes a unique office and commercial block on the school site. Allocated to soley the first level commercial space at 20,000 sf creates the opporunity for revenue. Within the office building block their is a total of 220,000 sf of leasable office space. Business that are willing to work with the school are believed to be the most beneficial to the overall school mission.

PROGRAM

Expected students = approx. 720 students
Expected Faculty = 57

DESCRIPTION	QTY	SIZE (SF)	TOTAL (SF)
LEARNING COMMUNITY	4	50,000	200,000
Advisories	3		
Studio	4	1,200	4,800
Team Room	1	1,000	1,000
SHARED SPACES			
Science Laboratory	2	1,250	2,500
Active Space	2	1,050	2,100
Conference Room	3	525	1,575
Presentation Space	1	1,000	1,000
Music Room	1	1,600	2,000
Cafe	1	1,000	1,000
Student Gallery	1	2,000	2,000
Restrooms	1	730	730
ALL SCHOOL PROGRAM			
ADMINISTRATION/OFFICE			
Waiting Area	1	200	200
School Director	1	250	250
Workroom/Copy	1	400	400
File Storage	1	350	350
Secretaries	1	600	600
Locked Storage	1	200	200
Data Processing	1	400	400
Nuse w/ restroom	1	450	450
PHYSICAL EDUCATION			
Gym	1	7,000	7,000
Gym Storage	1	200	200
Locker Rooms	2	1,250	2,500
Weight Room	1	3,000	3,000
ART AND TRADE LAB			
Construction Lab	1	1,500	1,500
Kiln Room	1	400	400
Manufacturing	1	1,500	1,500
Storage	1	600	600

DESCRIPTION	QTY	SIZE (SF)	TOTAL (SF)
CAFÉ			
Eating Lounge	1	2,500	2,500
Kitchen Office	1	200	200
Kitchen	1	1,300	1,300
BUILDING OPERATIONS			
Engineer's Storage	5	200	1,000
Engineer's Receiving	1	2,000	2,000
Engineer's Office	1	250	250
Mechanical	5	350	1,750
COMMUNITY CENTER		18,000	18,000
TECHNOLOGY LAB			
Program Manager	1	120	120
Computer Lab	1	600	600
Photography Room	1	700	700
Work Room	1	1,500	1,500
LIBRARY			
Main Library	1	4,800	4,800
Work Room	1	1,500	1,500
COUNSELING CENTER			
Counseling Offices	4	200	800
Career Center	1	1,500	1,500
Parent Center	1	1,500	1,500
Work Room	1	1,500	1,500
Net Square Footage			210,000
Gross Square Footage			255,000
OFFICE BUILDING			
Commercial	#		20,000
Office	#		220,000
Theater	1		11,000
Gross Square Footage			251,000

IX. DESIGN MODELS

High schools are often described as miniature cities, for they entail many functional elements and serve a diverse demographic. Thus, the architectural design of high schools should have qualities similar to that of a city, creating an active, communal, social and welcoming atmosphere, with clear circulation patterns and interior and exterior vistas. While each of these qualities or attributes does have a distinct uniqueness, the design models presented, illustrate how such qualities are dependent on each other. For instance, a communal space is premised on the idea of creating a socially interactive environment. In addition, there should be a variation and assortment of public, private, and semi-public spaces. This thesis draws upon a mixture of design models to express the diverse nature of a high school, articulated by the former mentioned basic design principles. The Sendai Mediatheque, Orestad Upper Seconday School, Arizona State Univesity Student Union, and Phillips Exeter Academy Library illustrate the major attributes which this thesis finds to be important to contemporary educational design.

A. SENDAI MEDIATHEQUE

An active space is vested in the social nature of people and the encouragement of movement. Although such characteristics are often attributed to outdoor spaces like parks, there are significant architectural examples that utilize such credo. The Sendai Mediatheque in Sendai-shi, Japan designed by Toyoto Ito exemplifies an active and welcoming environment. Through Ito's utilization of transparency, he was able to advertise the building with-

(Fig. 57) Interior photo of the Sendai Mediatheque

out signage, celebrating the functional use; "its transparent façade allowing for the revelation of diverse activities that occur within the building."[161] From the exterior, the facility houses a library, gallery, and visual media center is apparent. The curtain wall with a visually minimal structural system allows the boundary between interior and exterior to fade away. Silloway explains, "through the transparency of the façade and the continuation of the curtain wall to the ground this space [, the lobby level,] reads as a continuation of the surrounding city."[162] In the context of school design, allowing the exterior and interior to become one, will make the facility more inviting.

(Fig. 58) Photo looking into the Sendai Mediatheque from the exterior

Beyond the visual quality, articulated by the incorporation of transparency, the composition and organization of the interior spaces demonstrates the benefits of fluid and open spaces. Each interior level of the Sendai Mediatheque was designed by a different designer. As displayed in the images, the interiors are broken up by moveable walls, screens, furniture, or the tree like columns. The simplistic elements of the space create a fluid and open space, giving patrons exterior and interior vistas. These design methods divide the space, but still create a constant display of activity. The Sendai Mediatheque serves a model for educational buildings for creating a dynamic and interesting environment, for not only the school body, but also the community.

161 Silloway, Kari. Sendai Mediatheque. 2004. www.galinsky.com/.../sendaimediatheque/index.htm (accessed November 2009).
162 Silloway.

B. ORESTAD UPPER SECONDARY SCHOOL

(Fig. 59) Exterior photo of Orestad Upper Secondary School

The Orestad upper secondary school in Copenhagen, Denmark designed by 3XN is great example of innovative educational design. Following the design features of the Sendai Mediatheque, the Orestad facility uses transparency to celebrate education. The first floor is a transparent glazing, thereby giving passersby free views into the interior. The upper floors do the same; however, the architects used mechanized louvers to control the penetration of sunlight.

Four boomerang shaped floor plates rotate around the central open space creating a dynamic and activating atmosphere. A large stair case rises through the central space acting as the primary "connection up and down, but also a place to stay, watch and be seen."[163] In the central hall a portion of the floor plate extends into the open space; "a spatial expression of the colleges' ambition to promote interdisciplinary expertise between study zones with physical and visual links."[164] Significant is the designer's direct method of integrating disciplines

(Fig. 60) Interior photo Orestad Upper Secondary School

163 3XN. "Orestad College." 2009. http://www.3xn.dk/.
164 3XN

(Fig. 61) Exterior photo of ASU union

through visual cues and proximity. Often students and teachers are cutoff one another because spaces are compartmentalized, but the Orestad has dissolved such barriers.

C. ARIZONA STATE UNIVERSITY UNION

The commons of a school serves as the heart of the school community, permitting for a range of activities. Much like a primary city node, a commons is the focal point from which everything radiates from. The Student Union at Arizona State University east campus, provides a unique example of a space built for felixiblity, durability, and socialization. At the center of the campus, the union becomes easily accessible to all who wish to use it. The building serves as the campus hub, facilitating the interaction among students, professors, and other faculty. "The building acts as a container of activity with large multi-function and flexible spaces that open up to a future pedestrian mall and plaza space."[165] The facility program includes a student lounge, coffee shop, game room, information desk, bookstore, 400-seat banquet hall and lobby. The large open space is simple in its design, but creates a versatile and useful space for a range of different activities.

(Fig. 62) Interior photo of ASU union student lounge

165 Architectural Record. Building Types Study: Colleges and Universities. http://archrecord.construction.com/projects/bts/archives/universities/07_ASUPolytechCampus/default.asp

(Fig. 63) Interior photo of ASU union book store

Much like Sendai Mediatheque, the Arizona State University student union has dissolved the barriers between inside and outside. The transparent facade, large overhead doors, and extended steel overhangs connect the exterior and interior. In addition, the shaded walkways surrounding the building make accessing the facility an enjoyable experience. These design tools invite students and faculty into the union. A high school should utilize similiar design tools to invite community members and the school community inside.

Soft colors and a respectable material pallette further make the student union a great model for a high school commons. Passive shading devices prevent direct sunlight from entering the building, while florescent lighting is used to soften the ambiance of the interior. "The exterior scrim reduces direct sunlight by 70 percent."[166] Futhermore, as a response to the more established and traditional university buildings, the architects chose a "deep red to recall brick buildings of older."[167] A high school should be a community icon and fit into the context which it is in. Similiar to the ASU student union, a high school can utilize materials and colors which pay homage to the existing context.

D. PHILLIPS EXETER ACADEMY LIBARY

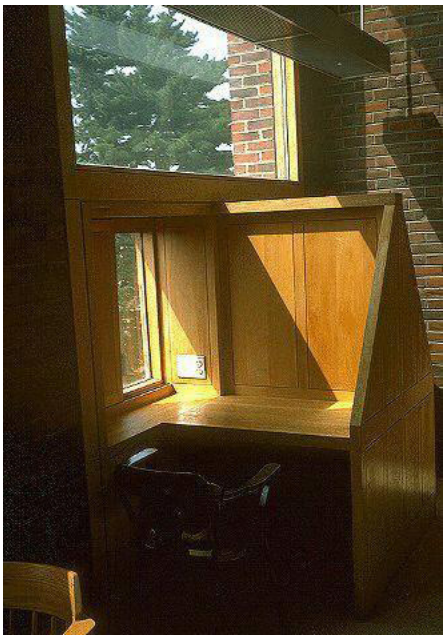
Thornburg's metaphor of the cave articulated how individual space is needed for reflection. The Exeter Library at Phillips Exeter Academy in New Hampshire, designed by Louis I. Kahn, is an exemplary historical example of individual study spaces integrat-

166 Architectural Record
167 Architectural Record

ed into design. The building is a reinforced concrete structure with a masonry cladding where the materials continued within the exterior and interior. The austere material pallette created a warm and comfortable space for students to study and read. The use of brick demonstrates how masonry structures can be beautiful and create interesting spaces. As the design project is specific to Milwaukee, WI, where brick is a traditional material, the Exeter library can also serve as a model for innovative use of masonry.

(Fig. 64) Exterior photo of Exeter Academy library

Most significant to the Exeter library, in regard to educational design, are the small individual alcoves which wrap the perimeter of the building. Tucked into an extended wall, the alcoves give students privacy without divorcing them completely from the larger space. Kahn's ability to control sunlight penetrating into the interior creates a soft glow of natural light within the alcoves. In project based learning students are consistently working as indivuals, consequently they need time to reflect in isolation. The spaces offered within the Exeter library would serve as a great model for individual spaces for high schools dispersed throughout a facility.

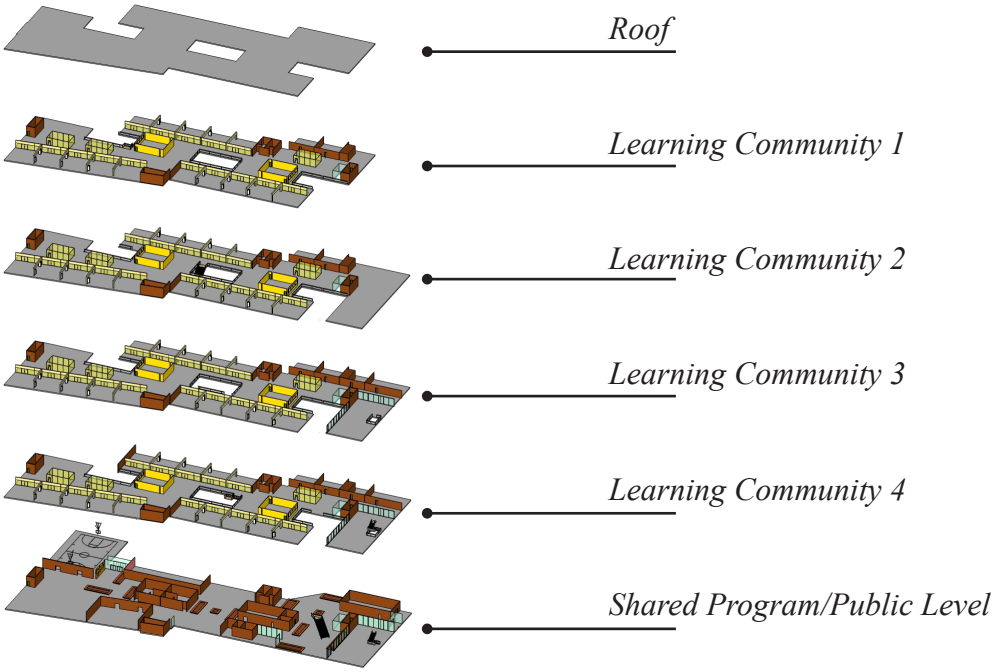


(Fig. 65) Interior photo of Exeter Academy library alcove

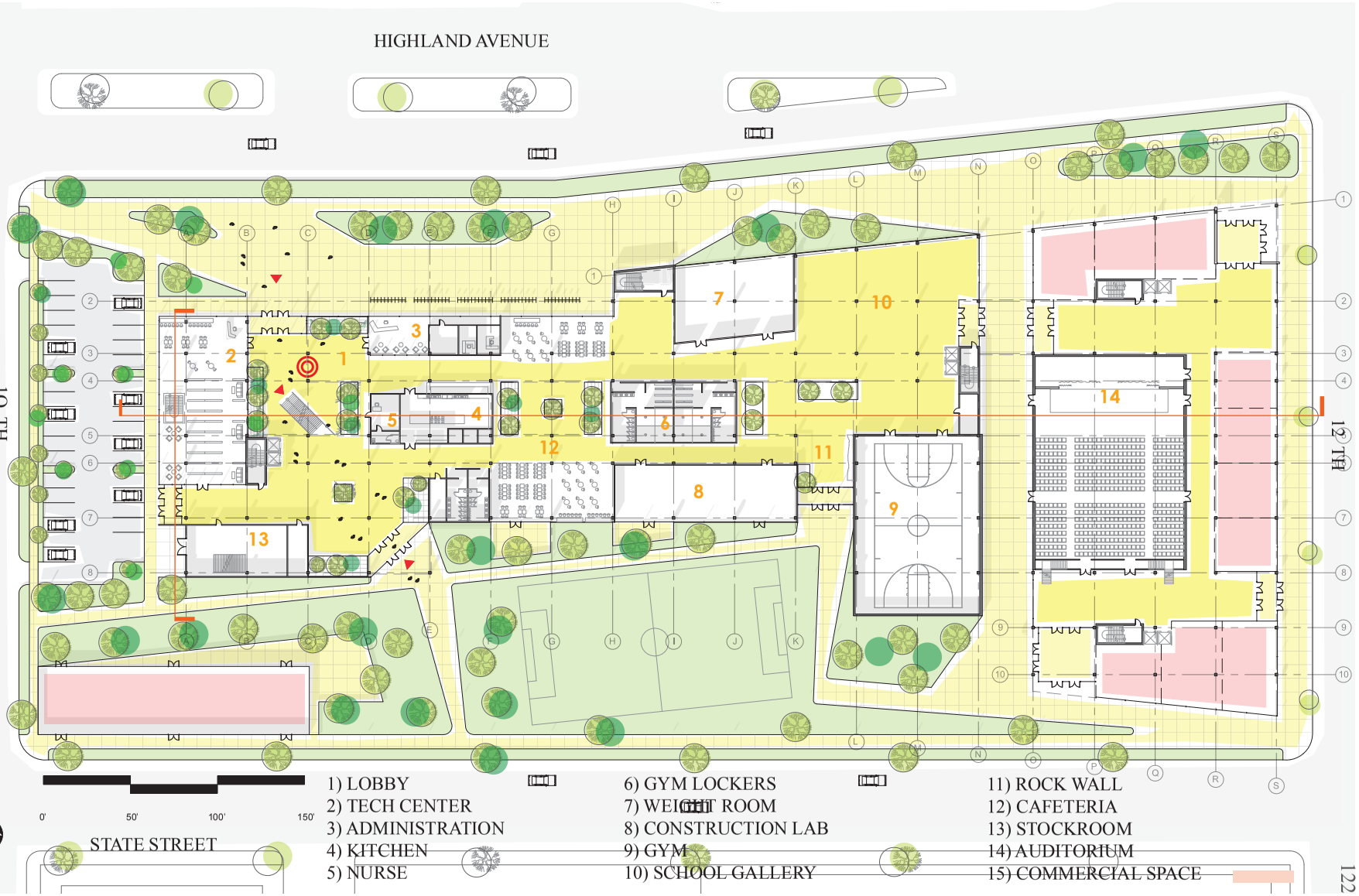
North Perspective

King Park High School is to serve as a model project based high school for contemporary education, designed to serve inner city students, emphasizing the potential of community engagement. With increasing fluctuations in student enrollment and rising expectations of students to be multifaceted, King Park High School rests on flexibility and functionality. The unique location, program, and overall design concepts build upon the key relationships between community, students, and advisors of which modern education relies on. For that reason, King Park High School, as an ideal, inherently becomes a community icon.

Four independent levels with diverse programs allow smaller school communities, such as independent charter schools, to operate during low enrollment periods. While the clustering of four schools within a school multiplex realistically allows small schools to have access to the advantages of a comprehensive high school. Coming together these schools within in a school are able to manage and share resources that are too often left



First Level Plan



1) LOBBY
2) TECH CENTER
3) ADMINISTRATION
4) KITCHEN
5) NURSE
6) GYM LOCKERS
7) WEIGHT ROOM
8) CONSTRUCTION LAB
9) GYM
10) SCHOOL GALLERY
11) ROCK WALL
12) CAFETERIA
13) STOCKROOM
14) AUDITORIUM
15) COMMERCIAL SPACE

out in smaller schools. Furthermore, by intensifying the usage of the site the school becomes much more than a typical high school. King Park High School offers a wealth of community resources creating a mixed-use educational facility including commercial, social service, and office space. King Park High School bridges the relationships

Main Lobby

between community members, business, and education working with and for students. The location, bordering downtown Milwaukee, Marquette University, and the Near West commercial district offers students and business professionals the opportunity to interact with one another.

A. THE DESIGN-KING PARK HIGH SCHOOL

The main entrance is located along Highland Avenue in between the administration and community tech center. Administration serves as the main security control point

directing access to both the community center and the school facility. Locating the administration along the perimeter is meant to increase natural surveillance creating a safer and more welcoming environment, hopefully eliminating or limiting the need of security officers and metal detectors.

The intention of the first floor is to highlight the flow across the site. The first floor contains large and loose corridors creating a fluid and open layout. The main stairway sits in the lobby atrium space directly adjacent to the main entry and administration. The three atriums throughout the building create a vertical visual connection between the public and the learning communities. Vegetation throughout the more public spaces of the school is essential to create non-sterile environment. In addition, the student gallery is situated at the east end of the school adjacent to the office structure, in the event that the first floor is left open to the public and visitors may tour the first floor.

B. LEARNING COMMUNITY

The typical level is a small learning community. Based on the program, conceptualized in the earlier phase of the project, a small learning community is composed of 3 advisories each with four advisors overseeing 60 students, with a total of 180 students per learning community. As a small learning community within the larger school it can function independently. This means each community requires a diverse mixture of spaces on each level including lab space, large group spaces, kitchen and dining spaces, active spaces, etc.

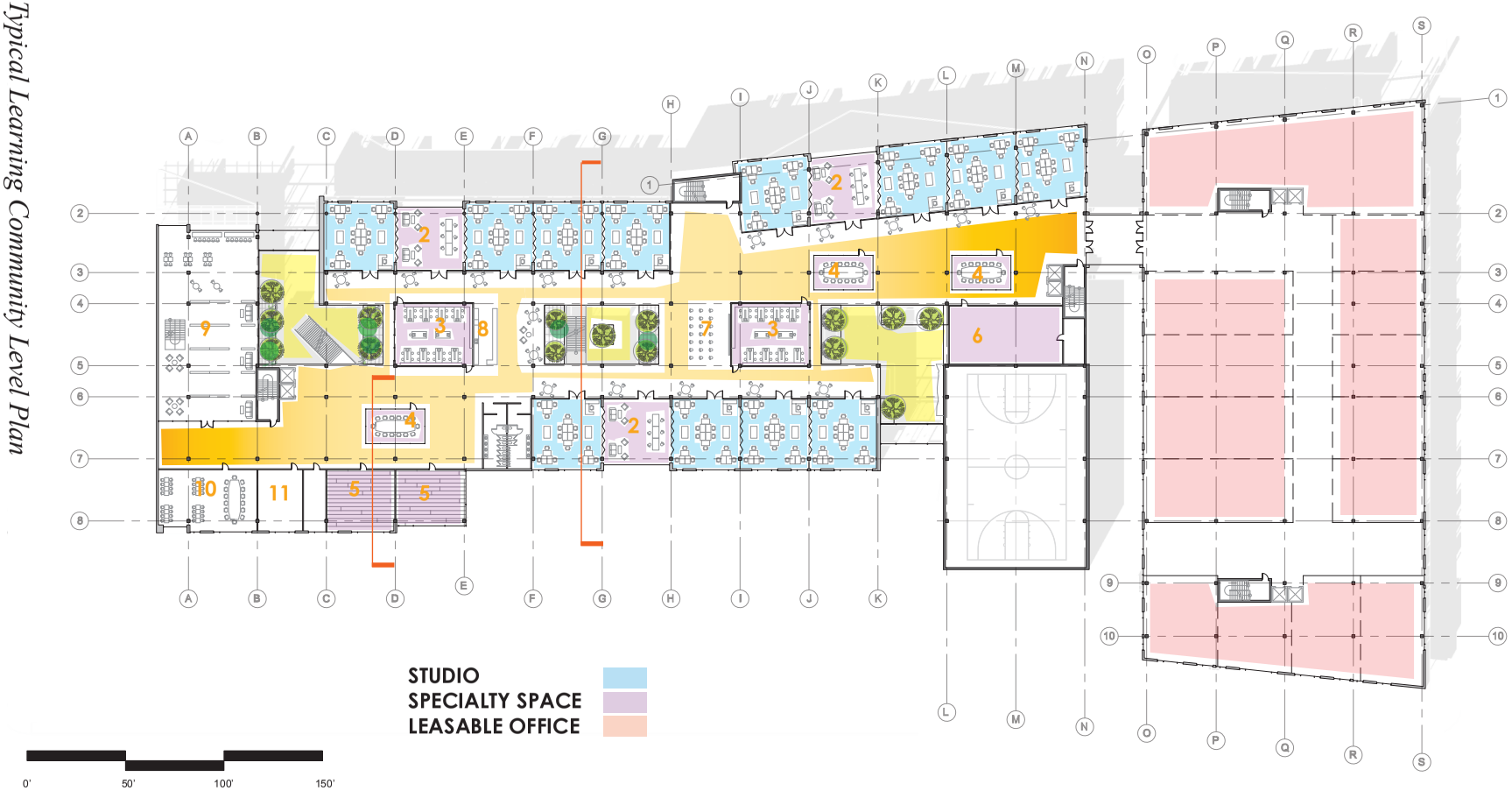
Case studies and interviews have informed the design of learning studios to be arranged within an open plan; however, the logistics of noise, movement, teaching feasibility, etc. require a more balanced design. Consequently, each studio within an advisory, is contained but there are sliding doors internally which allow for an open plan. This creates an opportunity to have multifunctional spaces such as individual studio lectures and

Studio displaying adjustable doors as writing surface

Studio

Team Room

Typical Learning Community Level Plan



1) STUDIO
2) TEAM ROOM
3) LAB
4) CONFERENCE ROOM
5) ACTIVE SPACE

6) MUSIC
7) PRESENATION SPACE
8) CAFE
9) LIBRARY
10) PUBLIC WORK ROOM

11) PHOTO LAB

independent work space. The sliding doors also function as presentation spaces. It is recommended that the sliding doors are multifunctional. For example, the material of the doors may function as marker boards to act as a writing surface and projection screen or as cork surfaces to allow students to pin up drawings or presentations. Larger desks provide students with individualized space to create a feeling of ownership. The students are able to store their supplies, books, and personal belongings at these desks. It is recommended that each student be provided with a laptop and access to a wireless network. To aid in the process of collaboration and socialization among studio faculty and students, each advisory contains a group space allowing any number of students or advisors to come together, providing a loose functional space. It is intended that group spaces provide a mixture of soft seating developing a certain comfort level, as it sets the tone for the space, encouraging social development. Break out spaces outside the studios provide for a casual group discussion space while not disturbing other student activity.

Two active spaces, provided in each learning community, are meant to incorporate a wide variety of physical activity from the following: yoga, martial arts, dance, ballet, aerobics, meditation, Pilates, and calisthenics. These active spaces are located on the south side of the facility looking over landscaped exterior space. This provides natural sunlight as well as exposure to those on the pedestrian walkway. Making spaces conducive to physical fitness will aide in the prevention of teen obesity and will also provide a well-rounded and fun educational environment. Providing such diverse programs increases not only students' participation but the advisors as well. As advisors are expected to be more directly involved in the creation of programs and students educational experience, advisors will be utilizing these active spaces with regularity.

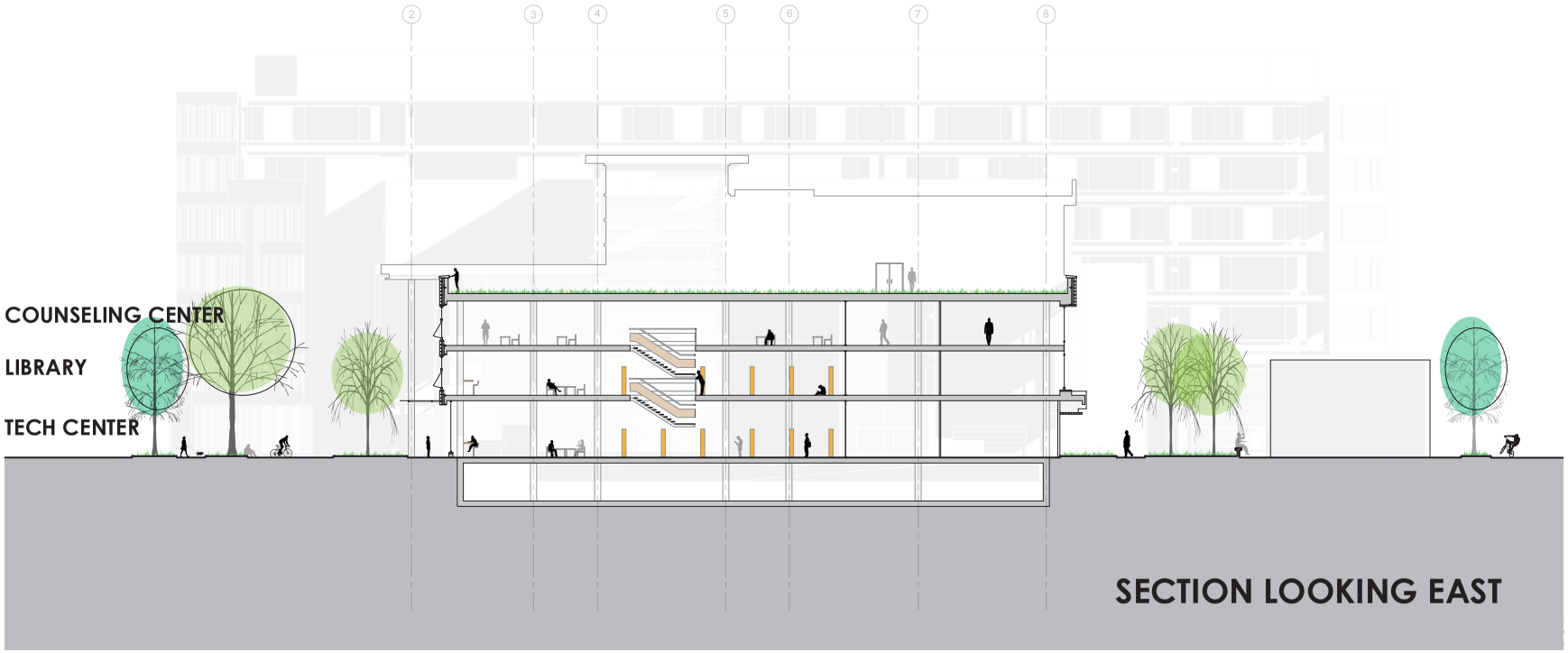
As project based learning is fundamentally about flexibility and interdisciplinary knowledge, the lab space must be designed as a multifunctional space, so that it could be used for all sciences as well as other disciplines like engineering. Each lab space is 1200

square feet which is suitable for small lectures and individual lab activity. Smart benches are recommended for the space as they will provide electrical and plumbing fixtures to best meet the needs of the students' diverse learning experience. These benches are portable units allowing the space to be more useful and to fit the particular needs of a project whether it involves biology and chemistry.

Each learning community contains its own music/theater space, in addition to the larger theater, present in the larger facility. This allows for students to have access to a space suitable for playing instruments, singing, acting, etc. The room is placed on the outside wall isolating it from the central space. Much like the active space offering more regular access to such a space affords students the advantage to be involved in their own artistic adventures.

A majority of the targeted student population is eligible for subsidized meals including breakfast and lunch. This requires the school provide a full service kitchen; however, the school also recognizes that the pedagogical framework of project based learning allow students the opportunity to participate in their own nutrition such as culinary arts. Therefore the design included a large cafeteria as well as kitchen and dining areas on each small learning community.

The more group oriented spaces like the café and presentation spaces are located near the central atrium. It is the public point of the plan. All studio spaces and active spaces are located along the perimeter of the plan for access to natural light, outdoor views of the city, and natural ventilation. Exposed electrical and ventilation systems are meant to save material cost as well as recall the industrial heritage of Wisconsin. The lack of dropped ceilings, typical of traditional schools, also creates more breath within the space. The use of moveable furniture and different types of seating allows students to customize the space much like a Starbucks model. For example, the furniture can be organized to accommodate a large group discussion or individual student work.


2
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4
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6
7
8
COUNSELING CENTER
LIBRARY
TECH CENTER
SECTION LOOKING EAST

Each learning community has an array of different programmatic elements, however by intensifying the site creates an opportunity for a wider diversity of resources. Clustering the small learning communities into a multiplex high school allows for the students to have access to theatrical performances, sport events, and participation in after school activities; therefore additional facility spaces include a gymnasium, weight room, rock climbing wall, construction/metal lab, library, and photography studio. In addition, the community center allows the public to engage in the educational process and provide the community the opportunity to utilize the great resources of the high school.

C. COMMUNITY TECH CENTER

The community tech center is located at the main corner of Highland and 14th Street providing an accessible resource to the community. The school is located along the northwest side of the site presenting itself well to the community. The community center is the cornerstone of engagement among all key relationships, between students, advisors, parents, and community members. The first floor contains free public access to computers and internet along with contemporary media resources such as newspapers, publications, and magazines. The second floor is modeled after a typical library space with bookshelves and small individual work spaces. The third level contains counseling space, a career center, and parent center. Located here will be the social worker and psychologist connecting not only students but the community with existing resources. By situating such resources on the third level, parents and community members will be brought into the facility fully integrating them into the educational process. The facility will also aid in the digital literacy of the inner city community. In addition, the facility has the potential to meet the future needs of Milwaukee, as Governor Doyle has allocated funds for such tech center programs throughout the city.

Main Lobby

Tech Center

Tech Center Information Desk

D. COMMERCIAL, OFFICE AND SOCIAL SERVICE SPACE

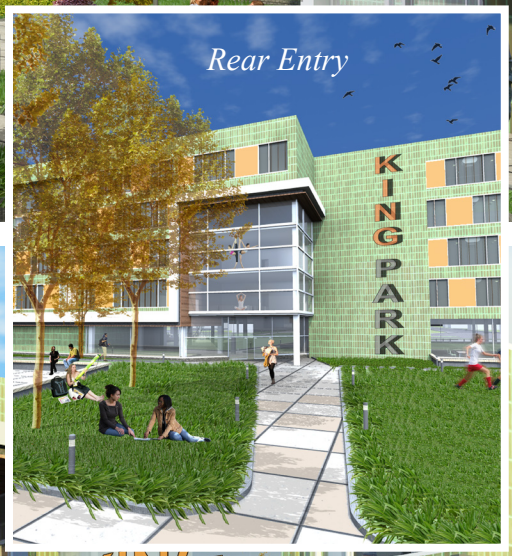
To intensify the community program of the site, access to recourses, and to capitalize on the financial opportunity of the site, commercial space was allocated to the east and south end of the site. The east end is leasable commercial space where the first floor space is recommended to lease to eateries and "mom and pop" stores to generate local community involvement. The site is located near Aurora Health Center which provides a large pool of customers for these stores. The upper floor spaces are allocated for businesses that are willing to work with the school in providing service learning opportunities. The space to the north side within the office structure is intended to be the shared space between businesses and the school. To entice businesses to participate, it is intended that the school offer decreased rent or other financial incentives. The south end site is a small day care or Early Head Start program further engaging the community and providing a valuable resource to the working families. While this space could have been open ground space, it is recognized that adding more social service square footage would be more beneficial to the inner city community.

The theater is located directly behind the east end commercial space. The theater has a commercial mechanism, available to be rented by community groups or by the larger public. Providing a theater on the site allows for the larger school to meet as a whole, put on plays and performances.

E. EXTERIOR

The entire first floor is floor to ceiling glazing thus creating the element of transparency. The public is able to view the inside of the school and this creates not only a celebration of the education but allows the school to be more welcoming to the existing community. Stone cladding recalls the contextual materials of masonry found in the existing community, while its vibrant color calls attention to the school. Wood, used on the

Rear Exterior Rec. Space



Rear Entry

Main Entry

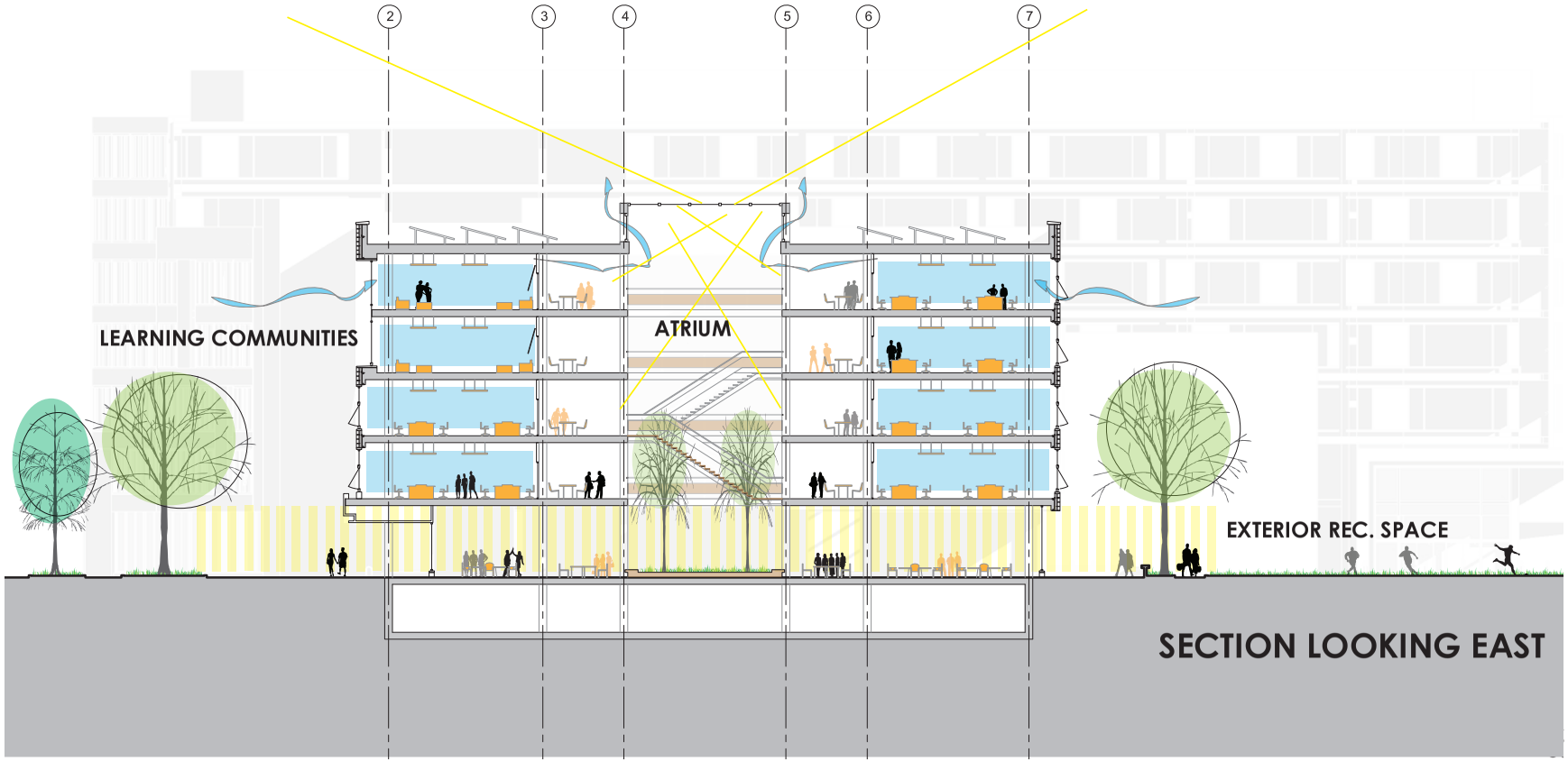
overhangs, complements the glass and stone cladding. The overhangs themselves are designed with recessed can lights, so that in the evening hours the lower portion of the school is brightly lit. Although there are several unique elements in the school, there was an attempt to create a somewhat repetitive structural and cladding system to provide efficiency in the construction process thus reducing overall cost.

The public way is designed to have a more fluid motion directing people toward the facility. Lights are placed along the public way to create a park experience and increase security at night. Trees are used as natural sunscreens decreasing direct natural sunlight into the building. Although outdoor activities are limited do the regions long and cold winters, exterior seating allows for the public as well as students to interact with the site when the weather permits. All of these concepts enable a more accessible school and increase security.

F. SUSTAINABILITY

All efforts in designing King Park High School integrated concepts of sustainability. As the site is within the inner city, it is beneficial and unique to allocate a substantial amount of outdoor space for natural vegetation and growth. The vegetation reduces the amount of hardscaped area, thus reducing water runoff on the site. The increased use of native Wisconsin plants is often lacking in these neighborhoods and by utilizing landscape it adds vibrancy to the community, inviting the public within the boundary of the site.

As in all cases it is strongly recommended that local materials be utilized, in an effort to design sustainably. In addition, the building has many key features to promote the education of sustainable design and lifestyle not only for the students but the community at large. One key feature is the use of passive environmental controls. Operable windows allow the users to customize the environment within the facility during the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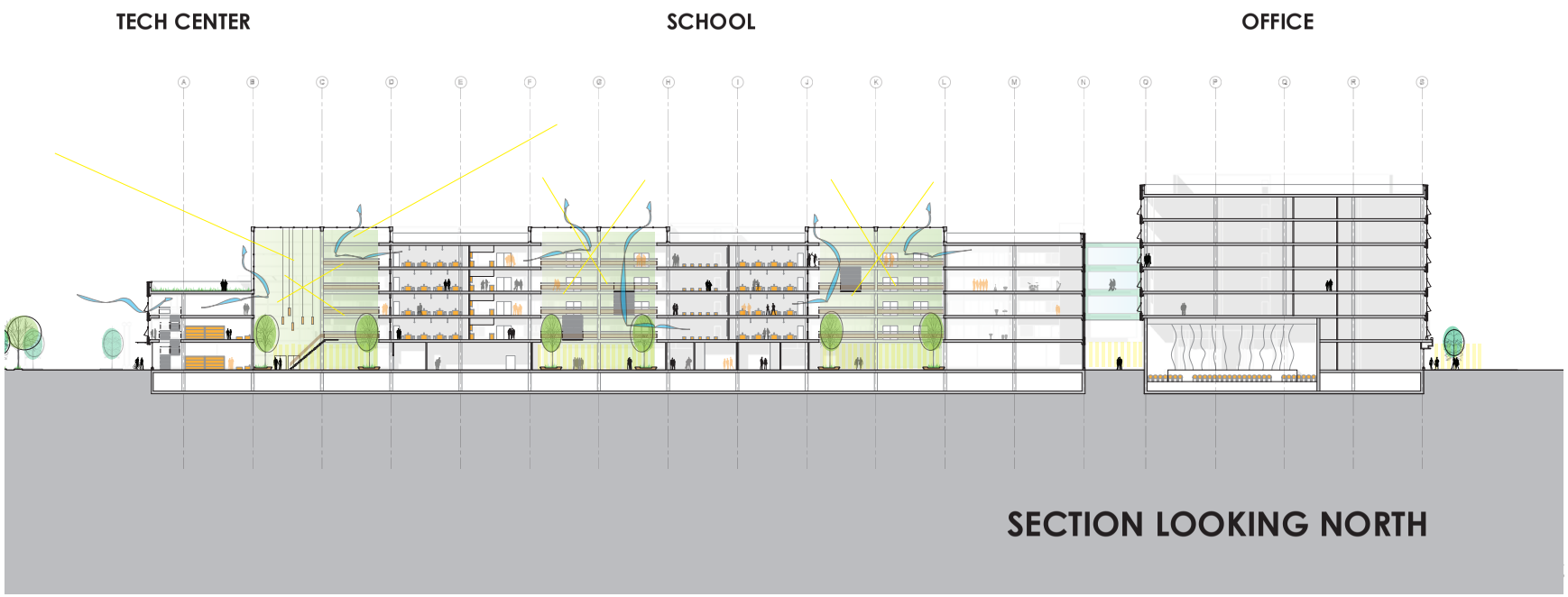
6
7
LEARNING COMMUNITIES
ATRIUM
EXTERIOR REC. SPACE
SECTION LOOKING EAST

spring, summer, and fall months thus reducing reliance on expensive mechanical systems. The atrium space serves as a natural pressure release to exhaust hot air and allows for an abundance of natural light to shine into the interior. Another key feature is the introduction of photovoltaic panels and a green roof above the community center. Not only are these elements to serve as a means to reduce operating costs, but they also serve as a learning tool for students. For example, students will have the opportunity to learn about renewable resources.


TECH CENTER
SCHOOL
OFFICE
SECTION LOOKING NORTH

XI. DESIGN GUIDELINES FOR PROJECT BASED LEARNING COMMUNITIES

Project based Learning communities, like many design typologies, requires a specific set of design features to ensure its success. Contemporary schools can be better suited for contemporary education when they incorporate student centered practices, small learning communities, and community involvement. As these factors involve a wide spectrum of issues, the guidelines are concerned with planning, building design and programming.

The purpose of these guidelines is to give stakeholders involved with various aspects of school location, design, and possibly construction factors that aid in developing a school program and design for contemporary education, specific to the inner city. Inner Cities are defined as core urban areas that currently have higher unemployment and poverty rates and lower median income levels than the surrounding Metropolitan Statistical Area.

A. PLANNING

The location of a school defines the basic parameters and physical relationships by which the users, community, and larger public interact with each other. Too often schools are left to be autonomous from the surrounding community, creating disconnect from its primary users and the existing business and residential community. By placing proximity at the forefront of the planning process, schools are given a head start in developing a successful and long-lasting relationship with the community.

Locating a school within a mixed use area allows the school to develop relationships with other community resources. Community resources like public libraries, colleges, universities and businesses are the most pertinent resources to students, and should not extend beyond one-half mile from the school (approximately a ten minute walk). In

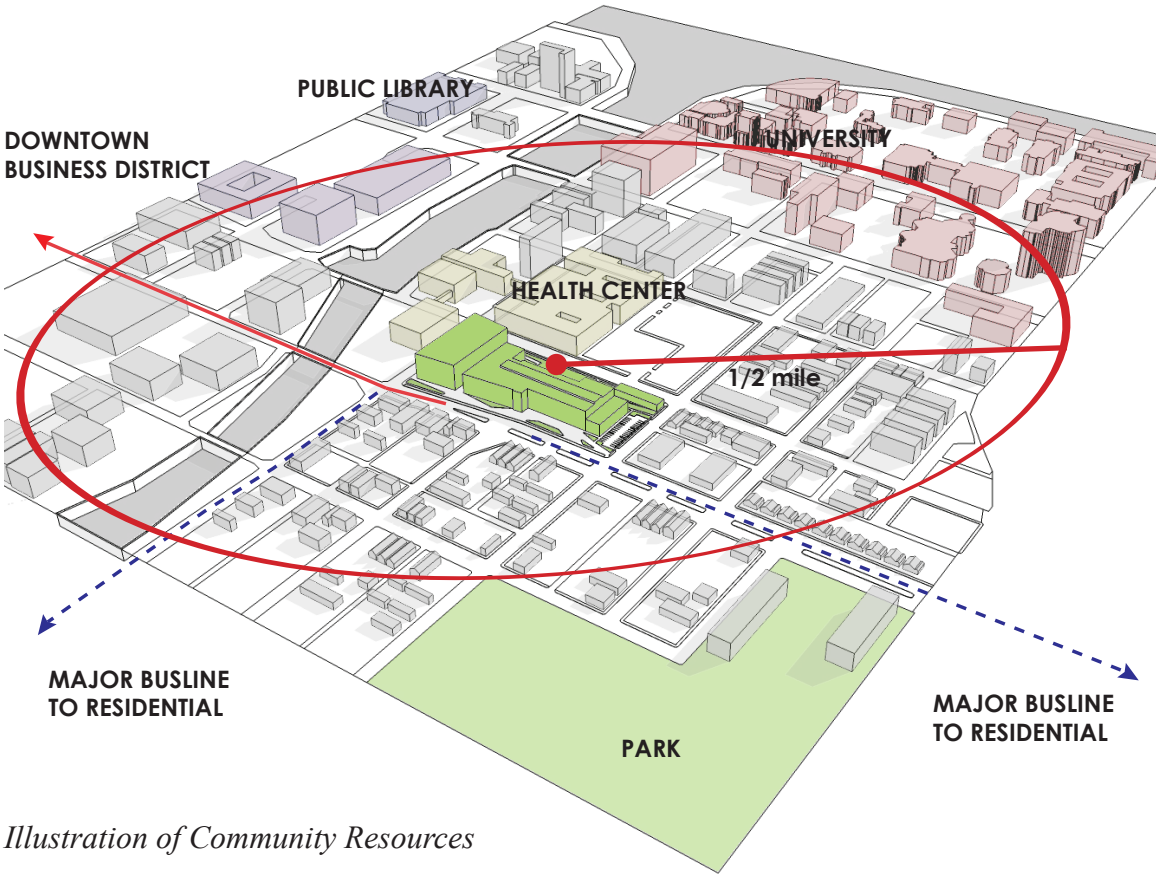


Illustration of Community Resources

addition, as it is rare for inner city schools to have exterior recreation space, a park in close proximity may be very beneficial. Keeping such resources within this walking distance will increase the regularity and ease of engaging these resources. If locating schools within an existing mixed use area is not possible, the school should be located directly on a primary public transportation line. However, the distance of travel to businesses districts should be minimal, as to not completely divorce the perception of connectivity. Creating a connection within the community can be offered through students' participation in the community and the community's interaction with the school.

B. COMMUNITY ENGAGEMENT

First and foremost, a school needs to involve the community in the education process, allowing the public to participate and engage school resources and activities. Often schools have a wealth of underutilized resources which can be easily opened up to the

community. With a nominal expansion of typical library function, schools can offer a valuable resource to the community. In the inner city, the most beneficial resource that a school can offer is access to technology, as to increase digital literacy. From the onset schools have budgets for books, computers, printers, and digital media. Schools merely have to expand the scope of the library program to include the community as a user. Therefore the school can offer library resources like internet access, digital media, and books to the public to create a public technology center. However, the library/technology center must be advertised as a public resource and not hidden within the school facility.

To increase the interaction among the school and community, the school may offer social services like counseling and parent centers. Such resources can establish the value of education within the inner city among not only students, but also parents and the community at large.

C. SERVICE LEARNING OPPORTUNITIES

A great benefit to having proximity to a diverse business community is students' easy access to service learning and practicum opportunities. Furthermore, as the U.S. Department of Education is preparing to expand service learning programs, an accessible business community makes meeting such requirements easier. Out-of-school experiences open students to a diverse network of professional opportunities, before deciding on career paths and higher education fields of study.

D. DESIGN CONSIDERATIONS

This thesis prescribes a set of design considerations for the interior and exterior architecture to further establish an atmosphere built on project based philosophies for which the program guidelines should be designed around. At the most basic level a project based school is built on creating a small intimate learning community. Based on

research of current schools operating in a similar philosophical framework, learning communities are typically no more than 200 students. Consequently, the environment designed for the limited student population should be inclined to promote an informal and intamite atmosphere. As such, this thesis rests on the belief that the space should embody qualities of an open fluid space with accents of smaller intimate spaces.

Within the inner city, it is most appropriate to intensify the site by including or accommodating for several learning communities within a single facility. This allows for the school to function either as a whole or as a cluster of independent small schools. From a fiscal perspective, this allows small schools such as charter schools the ability to have access to resources typical of comprehensive high schools including a gymnasium, auditorium, and library. Learning communities will most likely be stacked due to city fabric density.

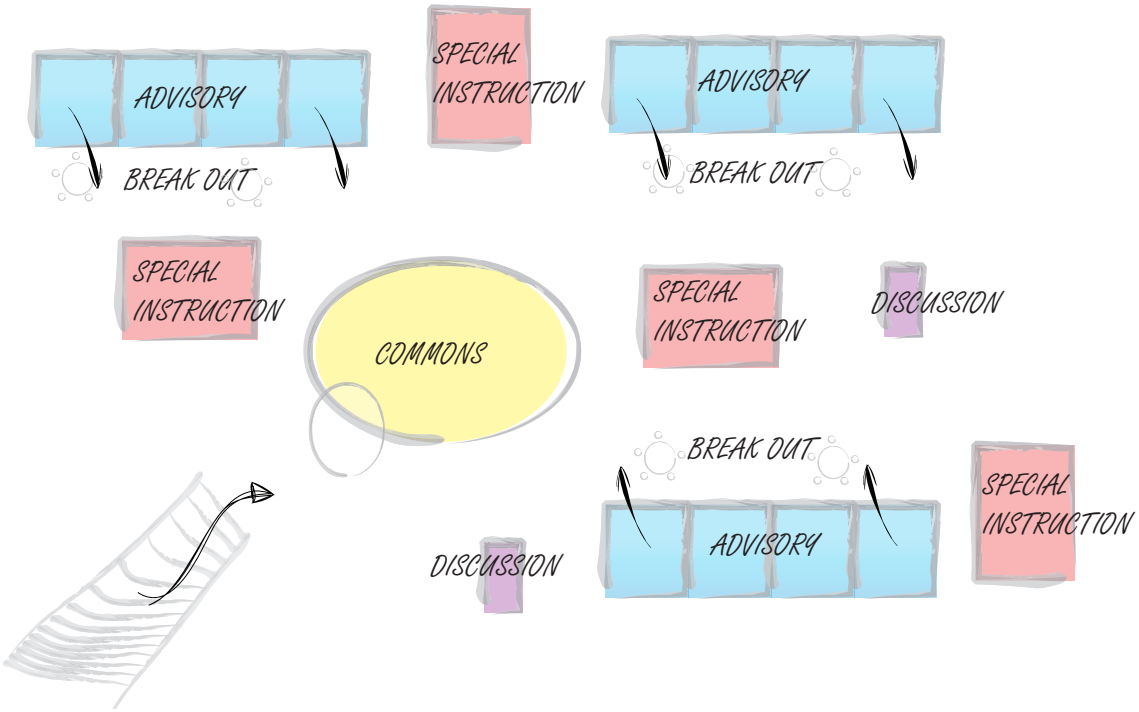
The main entry is one of the most significant design concepts, particularly the location of the administration due to the growing number of safety issues that affect today's inner city schools. The administration should be located at the main entrance visible to the outside to serve as the main security point controlling student and public patron access. From a purely design perspective, the entry should be apparent and welcoming. It is recommended that the main entry be transparent and have clear signage denoting the school name.

In concern of plan layout, at a fundamental level, irregularity should be encouraged. In specific, special instructional spaces and furniture should be dispersed almost spontaneously to give the perception of natural occurrence and increase perception of shared space. However, it is recognized that spaces themselves should have a repetitive nature as to maintain user equality. Advisories should be situated along the perimeter of the learning community, with a commons at the center, to increase autonomy among them. By doing so, the space creates interior panoramas displaying the mixture and

diversity of the learning community, in the hope of developing a sense of "community."

As a secondary design consideration, the material and color palette need not be limited to traditional school palettes. Keeping in mind the need for durability within a school, the interior should incorporate vibrant colors that liven up the atmosphere. Often schools are absent of color, in favor of neutral and white tones. In regard to the exterior treatment and material palette, the design should try to celebrate the educational use by way of transparency.

It is beneficial to appropriate funds or pieces of the site for commercial and office use. This increases the fiscal budget for the school system creating a constant source of revenue and ensuring the robustness of the program by encouraging buy-in from the community. Office space offers the possibility to on-site service learning opportunities which provides easy access for students without interrupting the learning process. This service learning relationship is reciprocal as businesses are provided novice and motivated volunteer work. Businesses can be encouraged to partner with the school by possibly reducing

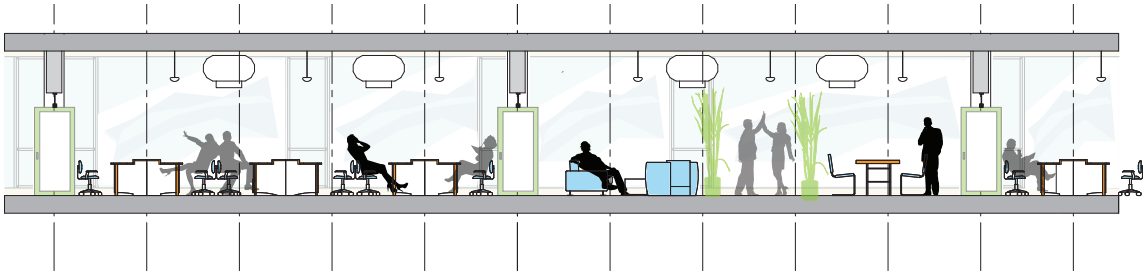


rent or subsidizing the cost of operation. Commercial use may be allocated to the first floor of such facilities and offer the opportunity for potential community businesses to operate such as “mom and pop” stores or non-profit programs. Such a mixed-use educational facility is unique but offers a plethora of resources and increases overall usage of the site.

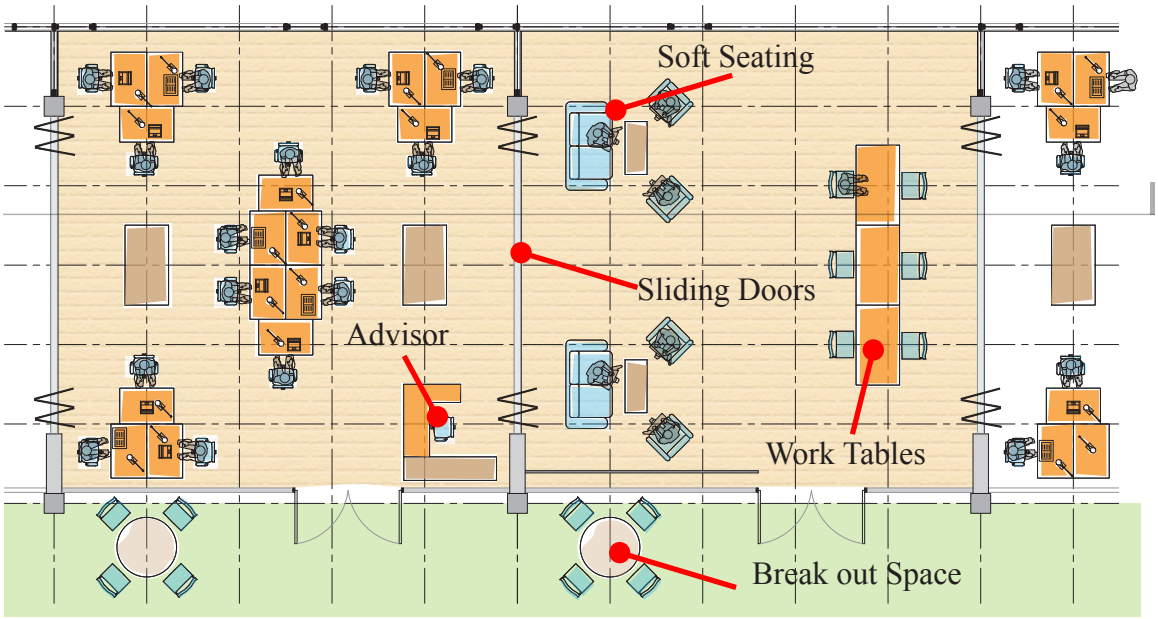
E. PROGRAM GUIDELINES

1. STUDIO ADVISORY/STUDIO

The most essential space to the project based learning community is the learning studio. However, as project based communities rely on the coordination of four studio advisors, creating an advisory, the design of a studio involves the design of the advisory.

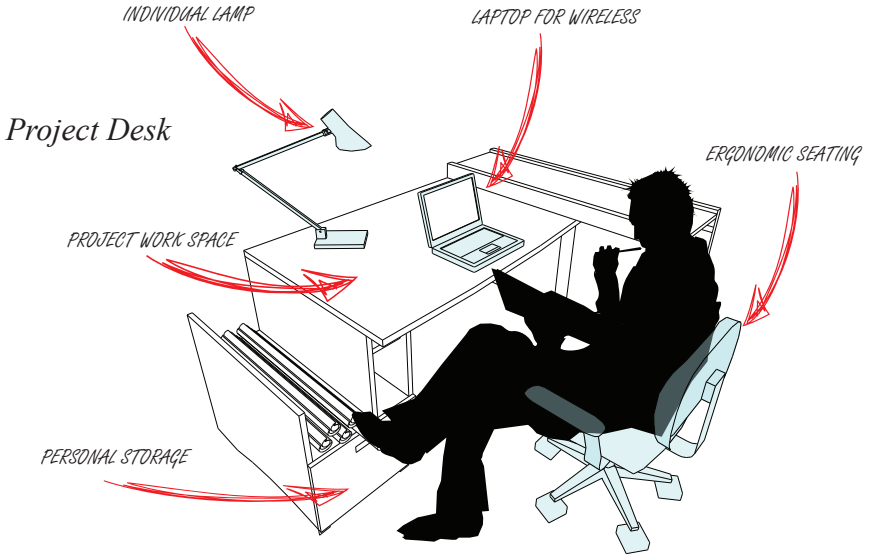


STUDIO TEAM ROOM



The studio serves as the student homebase, where students spend most of their time, which makes an advisory layout a primary concern. Project based communities thrive within an open plan concept, which allows for socialization and interaction, but also increases noise and decreases control. Consequently, the advisory must employ strategies to maintain the benefits while mitigating inconveniences.

Clustering studios into an advisory allows each advisory to maintain a certain level of autonomy among the learning community. The advisory must function as a unit permitting various types of activity, including lecture, discussion, group work, and individual activity. Learning studios within each advisory should be clustered in close proximity to each, as to ensure the advisors see themselves as a unit. Collapsible wall partitions between studios allow advisors to adjust their spaces to specific activities, limiting noise and maintaining the open plan concept. It is recommended that the adjustable walls double as a writing/presentation surface, creating a more functional space. The studio should be at least 1,200 square feet, which can accommodate up to 20 students and one advisor. The studio is designed to accommodate each student with a typical art desk (2.5'x 5'). The large studio desk allows for individual storage and project work. Furthermore, the space permits those with disabilities circulation throughout the advisory. A small breakout space containing a work table or sofas should be available to each learn-

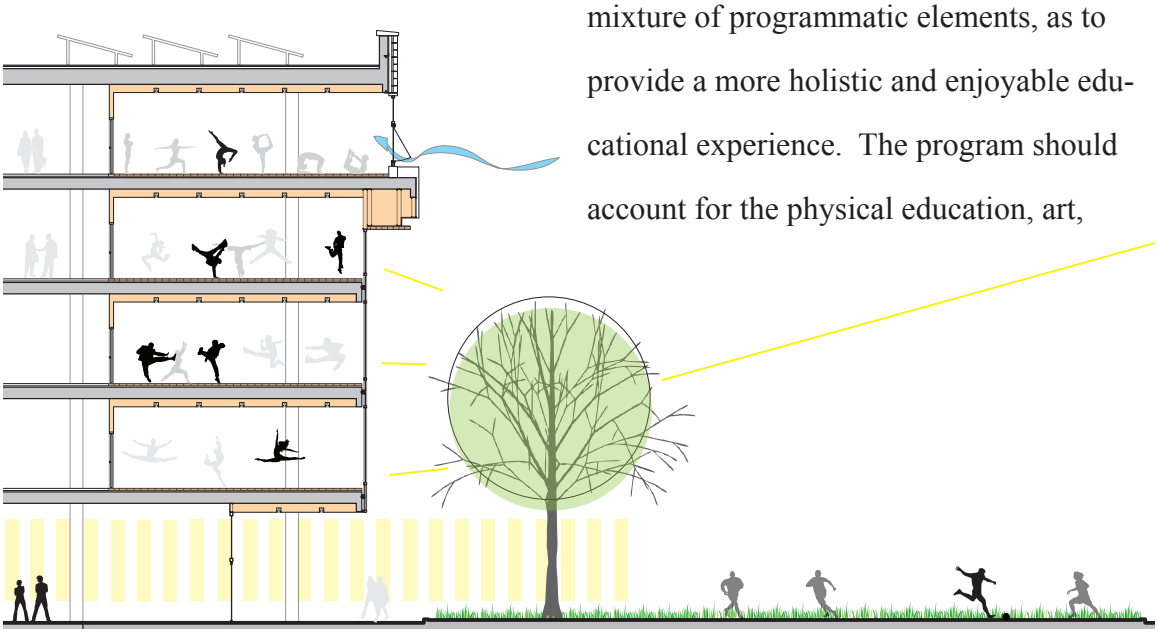


ing studios, as to accomodate for small group work during studio time. This allows students the opportunity to mix up their activities, as individual work can become monotonous.

If possible, it is also highly beneficial to provide a team room within each advisory, which offers a loose programmatic space for students and advisors. A team room serves somewhat like a lounge and breakout space, a space for soft seating and encouraging interaction among studios. The shared space encourages students and advisors to share projects and ideas. The team room need not be too large but should permit space for soft seating including sofas, lounge chairs, and a display board.

2. SPECIAL INSTRUCTIONAL SPACES

A primary concern of developing a contemporary school is the program. A learning community should operate more like an office, where students have the freedom to schedule their own day, utilizing different school resources at different times throughout the day. On the other hand, a learning community should create the sense of school community by way of a commons space. The program outlined is conducive to individual activity, group work, and entire studio activities. Schools should include a diverse mixture of programmatic elements, as to provide a more holistic and enjoyable educational experience. The program should account for the physical education, art,



sciences, and music. Furthermore, it would be beneficial to include elements that promote social skills and professionalism. Although each of these programmatic factors may involve very different activities, including these elements may be as simple as providing open floor space or a room, because most require minimal furnishings.

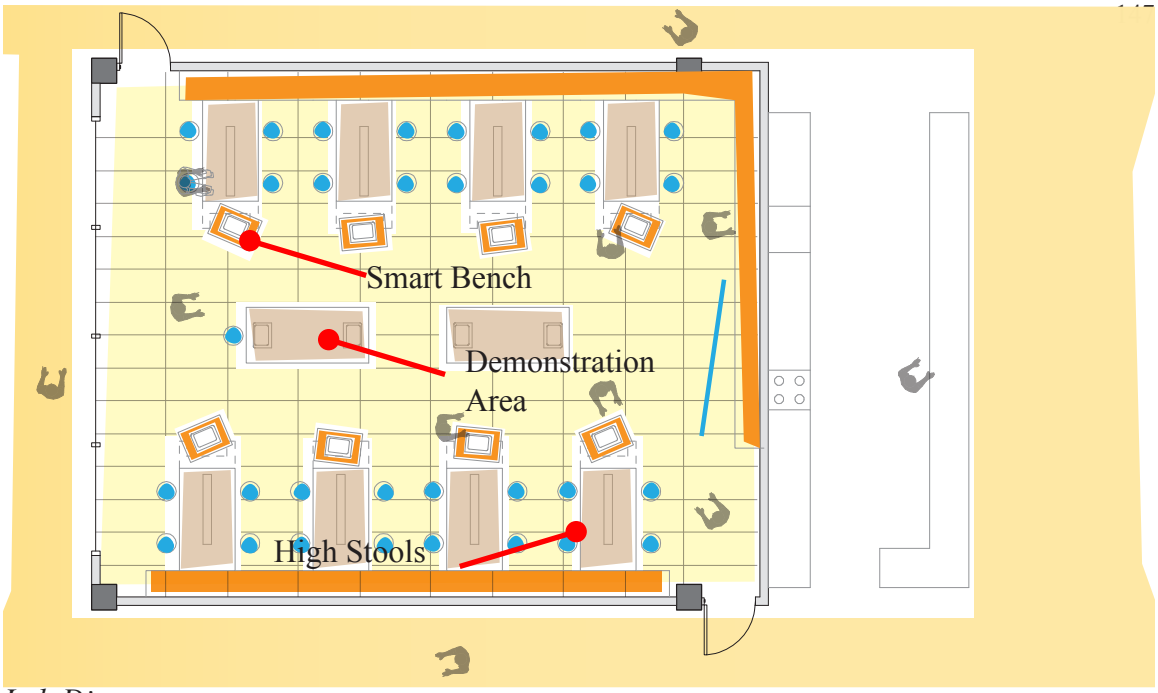
3. ACTIVE SPACE

Most small schools, including those with project based philosophies, have a strong focus on academics, almost to a fault. To encourage physical education among high school students and advisors, at least one active space should be provided for each learning community. An active space can be thought of as a dance studio, free of interior obstructions and furnishings. These active spaces allow for many different activities including yoga, dance, martial arts etc. A minimum of 30 square feet per person should be provided in this space, allowing for free active motion for every user. Including active spaces within a learning community program increases the likelihood of students developing healthy lifelong habits.

4. LABS

In regard to science education, a multi-purpose lab allows for the most optimal use among students within project based schools. The traditional school splits science labs into specific fields, including biology, chemistry, and physics. Creating a multi-purpose lab, conducive to wet and dry experiments, is more useful to students as individuals and learning communities as a whole. However, as it is still necessary to hold lectures to teach a group of students, the lab seating should accommodate entire studios and possibly two studios. This allows advisors to play to each other's strengths, where advisors with specific knowledge to a given lecture/experiment can teach larger groups.

In regard to furnishings, it is most beneficial to provide smart benches within the lab spaces. Smart benches are portable units capable of utilizing wet and electrical



Lab Diagram

fixtures. The unfixed units create a more functional appropriate space for project based activities, allowing several individual projects to proceed at the same time. Lastly, the overall functionality and flexibility of the lab can accommodate art activities. Much like science activities the arts require experimenting in a wealth of different techniques, using wet and dry materials. It is recommended that lab spaces be approximately 1,250 square feet, accommodating up to 32 students during lectures and individual projects.

5. MUSIC

Offering music space within a learning community further allows students to participate in a more diverse educational experience. Expertise in music space specifications should be procured if such a space is provided due to noise concerns. Furthermore, as activities in such a space can be quite obtrusive to other educational activities, the music space should be the most isolated space. The size of the space will vary depending on the ability of the school to provide necessary equipment.

6. COMMONS

The learning community as whole requires spaces for advisories to come together and interact within both a formal and informal manner. The advisories and special instructional spaces should radiate from a central commons, a more public space including an array of seating. The commons should be equipped with presentation technology so that the learning community can present as a whole to each other, establishing their skills in public speaking. If possible, learning communities should also have smaller presentation space, like conference rooms, dispersed throughout the community to increase the regularity of exposure to professional activities. In addition, a kitchen should be provided near the commons so that students can participate in their own nutrition which has the potential to develop student independence.

F. THE MUST HAVES

Project based learning is a unique educational philosophy which, as stated, requires an equally unique program and set of design principles. However, there are several features or elements that all schools, including traditional schools should include in school desgin-must haves. Most students spend the entire seven to eight hour school day inside, expcept for the possible one hour gym class during the warmer months, so the school interior must be as comfortable as possible. Small fixed frame windows are no longer an acceptable practice and nor are they healthy. Futhermore, as the 21st Century is littered with a vast array of useful and neccessary technological tools, students should be exposed to and educated on these technologies.

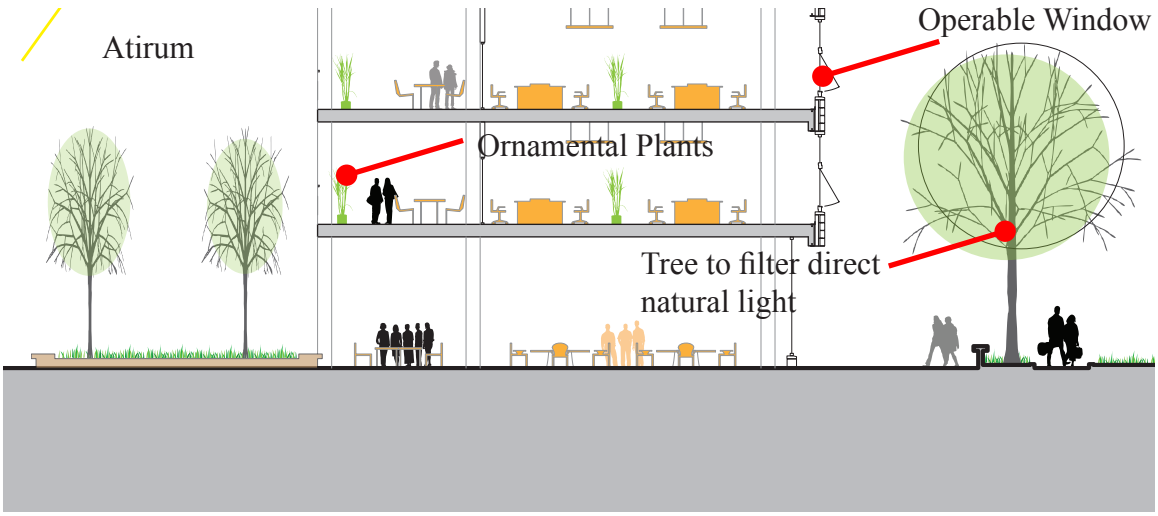
1. INTERIOR VEGETATION

Schools should bring vegetation inside to make a more comfortable and natural environment. Vegetation has both physical and mental benefits for building users. Vegetation cleanses the air of pollutants and releases oxygen into the air, creating a healthier

inteior environment. On a mental and emotional level, vegetation often puts people at ease by offering a tranquil and comfortable environment. At the simplest level, schools can put small ornamental plants in classrooms and other work spaces. However, native trees and shrubs within atium spaces can set the entire mood for a school and can offer a unique and comfortabel environment. Lastly, as people have become more disconnected from their natural environment, vegetation and plants can be used as educational tools. By having native plants, trees, flowers, and shrubs students can be educated about the natural elements.

2. DAYIGHT

Daylight is the most benefcial and vital natural element that school design should incorporate. Often, schools neglect the inteior spaces of schools and utilize only artificial lighting. Light wells, atriums, and skylights should be incorpated as much as possible, so that artificial lighting is kept to a minimum. Spaces that are directly exposed to daylight should utilize shading devices and light shelves to control direct exposure. In addition, it is reccommended that daylight be harnest by way of photovolatics or solar heating panels. All the formentioned methods of incorporating daylight greatly impacts the interior enviroment, but it if utilized correctly can reduce operating costs.



3. NATURAL VENTILATION

Schools rely on HVAC systems to control operating costs and often seal the building, leaving little natural ventilation. Temperature controls are left to automated systems, which does not allow occupants to alter uncomfortable temperatures. Furthermore, HVAC systems that are not installed correctly or serviced regularly can lead to a toxic and polluted air quality because of the numerous synthetic and harmful man-made articles in building materials. Therefore, it would be best to incorporate operable windows when ever possible and especially in learning studios. Operable windows allow users to take ownership of spaces, because they can alter spaces to specific needs. In addtion, like all passive environmental control, operable windows can great reduce energy costs.

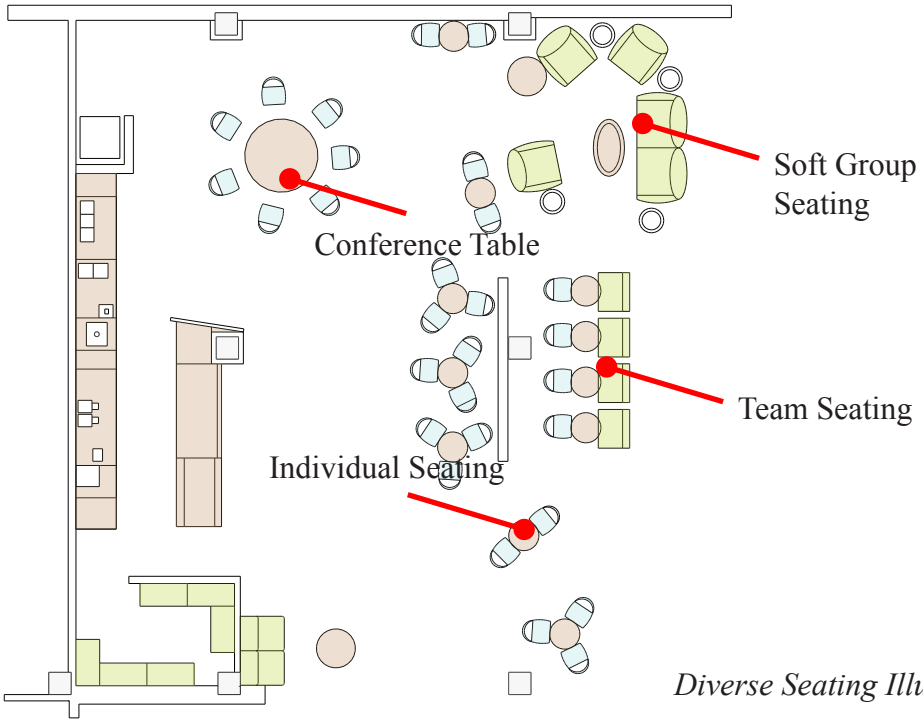
4. TECHNOLOGY

The diverse array of technological tools are vital educational neccessities for the present day student. The professional world requires that students utilize and be familiar with such tools. The laptop and internet are the most useful and practical of all new technologies. It is reccommended that all new schools utilize a wireless network and give each student a laptop. This allows students to create or inquire whenever they get the inclination. In addition, the flexibility of laptops and wireless interent allow students to take their education where ever they may be within a facility. Projection equipment and Smart Screens are also valuable tools which further student's exposure to the professional experience. With technological advancements and our reliance on such tools growing everyday, technology within schools needs to be more frequent and dispersed.

5. FURNITURE

School furniture is traditionally very simple wooden chairs and desks, which as most know, not too comfortable. With students spending up to eight hours a day in a classroom environment, schools need to offer a better solution. As project based learning

permits an array of daily activities for students, the furniture should be conducive to such activities. Furniture may seem like a trivial topic, but comfortable and useful furniture can have a positive impact on the perception and use of space. Soft seating creates a social environment, while conference tables have a formal intent, and art tables with high stools make working easier. Lastly, comfortable and diverse seating may make school seem less like forced manual labor. The more fun and comfortable designers can make a space the better, students deserve it.



Diverse Seating Illustration

XII. FINAL THOUGHTS

As public education attempts to find its way in the contemporary world, the King Park High School design model, will hopefully, aid in illustrating the necessity of defining a new set of design rules by which public high schools are designed. The goal was to manifest the philosophies of project based learning and the ideals of small learning communities within an inner city in physical form. The proposed design model illustrates the usefulness of flexibility, due to fluctuating needs of public schools, and the potential of utilizing the design methods outside the traditional educational framework. The interdisciplinary approach of project based pedagogies requires a communal atmosphere that allows student and teacher to engage one another on a more personal level while also connecting to the larger professional and public community. Expanding school program to include community and business uses allows education to become more relevant to present day needs. Education of students requires a well rounded and expansive approach. By placing students at the center of the process and allowing the public to directly engage education we can begin to bridge the gap between school and community.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