ABSTRACT

Title of Document: CONNECTING SCHOOL AND WORK: DESIGNING A LEARNING ENVIRONMENT TO ENHANCE CURIOSITY AND WONDER

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The overall trajectory of school design from the Industrial Revolution to today has been an evolution and expansion of the types of connections that a school is expected to enable. This thesis argues that by using the idea of making connections the goal of school design, one can design an environment that proffers curiosity and wonder as the most important part of learning. By allowing for a mixing student and worker environments, there exists an opportunity for a cross-pollination of ideas that will create a constantly evolving educational environment.

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CONNECTING SCHOOL AND WORK: DESIGNING A LEARNING SPACE FOR CURIOSITY AND WONDER

by

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Dedication

This thesis is dedicated to my amazing wife, Tara Myers, for her unwavering support and faithful encouragement me for me to pursue my dreams.

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Chapter 1: Introduction

Globalization, Technology, and the Environment

The traditional model of education is no longer adequate to prepare students for a world that is becoming highly dynamic. The system of education brought on by the demands of the industrial revolution in which students were prepared to work in a relatively stable context for most of their lives is no longer relevant. In his book *Out of Our Minds*, Ken Robinson argues that the changes that are beginning to occur as a result of the Digital Revolution will require a radically different kind of thinking. "The labour markets of the 21st century are changing beyond all recognition. This is not a revolution in a figurative sense, but a real one comparable in scale to the Industrial Revolution."[1] Robinson's three main tenets are[2];

1. "We are caught up in a social and economic revolution."
2. "To survive it we need a new conception of human resources."
3. "To develop these resources we need radically new strategies."

This social and economic revolution that he discusses is really only in its beginning stages. The changes to come can barely be imagined. How, then, can we educate children about their world when so much of it will change?

> *The quantity of information doubles every eight years. This means by the time a child born today graduates from college, the amount of knowledge in the world will be about four times as much, and by the time that child is fifty it*

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[1] *Ken Robinson, Out of Our Minds: Learning to Be Creative (Oxford; [New York]: Capstone ; John Wiley, 2001), 5.*

[2] *Ibid., 4.*

> *will be thirty-two times as great. By then, ninety-seven percent of everything known will have been learnt since that child was born.*[3] *–Alvin Toffler*

Robinson argues that to stay competitive and successful we must be able to keep pace with a global society that will be constantly developing new products, ideas, and services.[4] Second, he says, we must educate "people to be flexible and adaptable…"[5] Finally, as a result of this constantly changing world, people will need to be accustomed to change and no longer expect to "secure lifelong employment in a single job…"[6]

To adjust to this new revolution we will have to change the way we look at many 'stable' parts of our society. One such part is our system of education. The challenge for education, Robinson says is to "balance across the curriculum…balance within the teaching of disciplines," and to "balance between education and the wider world."[7] This is in conflict with our current method of teaching which makes reading and math the primary focus and devalues most of the arts/creative disciplines. Today, being proficient in the dominant disciplines means that you are 'intelligent.' Robinson contends that this logic was developed because those were the skills most needed for the populace to succeed in the Industrial Revolution era. The problem is, however,

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[3] *Inc OWP/P Cannon Design, V. S. Furniture, and Bruce Mau Design, The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning, 1st ed (Abrams, 2010), 221.*

[4] *Robinson, Out of Our Minds, 5.*

[5] *Ibid.*

[6] *Ibid.*

[7] *Ibid., 196.*

that intelligence is complicated and more multi-faceted than our current education model recognizes.[8]

We must develop a system of education that teaches creativity and adaptability above all else.[9] He cites the changes in hiring criteria by Reed Executive, PLC, one of the UK largest and most successful employment agencies. Reed has changed its model to prefer candidates that have high degrees of creativity and adaptability. "We must learn to be creative."[10]

The Next Evolution of Education Spaces

There are, of course, many pieces that are necessary to educate—the curriculum, resources, the community, the child's interest and parental support, the environment (the school) and the teachers. The purpose of this thesis, however, is to explore the role architecture can play in evolving the educational model and inciting creativity and critical thinking.

With the greater and greater mobility of laptops, tablets, etc. it could be argued that if one imagines technology as the primary driver of future pedagogy, schools—meaning a building designed specifically for education—will be become unnecessary. Any building capable of supporting group gatherings would be sufficient. Further still, it

[8] *Ibid., 9.*

[9] *Ibid., 201–2.*

[10] *Ibid., 203.*

could be argued that with the continued growth of online education, group gathering places might also be unnecessary.

On the other hand, it may be more accurate to realize that with the overwhelming power and captivating capabilities of the emerging technologies, an engaging and exciting school environment is more necessary than ever. The effects of technology on children's engagement with the world around them are not hard to see. Although this new technology brings great access to knowledge and certain kinds of collaboration, it also brings a disassociation from the 'real' world.

In the future, then, the benefits to education and knowledge from this technology will be even more overwhelming and disassociating. Consequently, we must discover ways to engage children in learning in ways other than through a digital device. Schools must be reimagined as places of collaboration, places of exploration, places experimentation, places of discovery—places of awakening.

In, *Space and Learning*, Herman Hertzberger argues that creating an environment that supports and encourages collaboration is critical to school design because "the one thing that can hold its own against the immaterial creatures on screen is real girls and boys. It is the presence of others that invests the school space with the most meaning…"[11] He states that we must create spaces that are "more varied, more changeable and, most of all, more open…that incite greater concentration but also

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[11] *Herman Hertzberger, Herman Hertzberger: Space and Learning (010 Uitgeverij, 2008), 69–70.*

greater exchange, that give a more expansive view of the world."[12] He believes that in addition to the changing culture and technological issues we must develop architecture that assumes more of the burden of education because of the increasing shortage of teachers worldwide. [13]

To this end, in *Linking Architecture and Education,* Anne Taylor proposes designing schools that are part of the pedagogy and help to teach. She asks, "How can we create interactive environments that serve as three-dimensional text books for learning?"[14]

This requires us to not just design buildings that meet the functional needs of its users but that also become tools, teachers, and continually evolving environments from which to learn. Taylor states that to do this we have to "…connect the two complex disciplines of architecture and education…occupy and use space designed expressly to stimulate their natural curiosity, where architecture is not a vacuous space but a learning tool."[15] She goes on to argue that not only must we reimagine our 'schools' anew but we also need to embrace the idea of "boundless education"[16]– education that goes beyond the classroom/school, and design all of our environments as learning/educational spaces.

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[12] *Ibid., 69.*

[13] *Ibid., 8.*

[14] *Anne Taylor, Linking Architecture and Education: Sustainable Design of Learning Environments (University of New Mexico Press, 2008), 3.*

[15] *Anne Taylor, Linking Architecture and Education: Sustainable Design of Learning Environments (University of New Mexico Press, 2008), 4.*

[16] *Hertzberger, Herman Hertzberger, 9.*

To address the evolving needs of education and society schools must be redesigned as environments of curiosity and wonder. The school must be capable of supporting multiple modes of learning and education, and must become an environment that stimulates and excites children's natural imagination and curiosity. The design of such a school must develop first from concepts of architecture that are about curiosity, wonder, creativity, and critical thinking. Those concepts can then be developed to provide the necessary functions of a school. This will create a school that uses the building as a tool to instill creative thinking and independent learning into the curriculum. Ideally such an architecture would also be paired with a similarly focused pedagogy.

Evolution of Learning Space

To begin developing an understanding of the changes in the fundamental assumptions of school architecture that are needed to embrace this new evolution in pedagogy it is important to first understand the roots of traditional school architecture and the attempts to break away from that model. With an understanding of the trajectory of school design and the ways in which its boundaries are redefined it becomes obvious that the evolution of schools has been toward eliminating the boundaries surrounding the traditional classroom. The following is a discussion of that process the leads to the possible hypothesis that the next leg of this trajectory requires a reevaluation of the boundary of the school itself and a proposal for dissolving this boundary by folding a school environment and work place environment into one learning campus.

In, "Place Making and Change in Learning Environments," Bruce A. Jilk explains that most compulsory education today is based on the idea of the teacher as holder of knowledge and originates in ancient Greece, and was enforced in the Industrial Revolution era by the Ford model.[17] He argues that this is also true of most of the school buildings that were built during this period. "Arguably the physical form of most school buildings has barely changed since mass education was first established in its basic form at the beginning of the twentieth century."[18]

The basic structure of these is based on what Taylor describes as *The Factory Model* of school design. "The industrial assembly line model for school design…repetitive identical classroom configuration…"[19] This assembly-line process is all about function and efficiency. Beginning with the massive developments of public education in the US and abroad during the Industrial Revolution schools were designed to support a teacher-controlled classroom in which students would learn a standard set of curriculum in an established process. For the majority of public education in the US this model still holds true today.

As early as 1833, England began requiring education for children. This was in response to the large numbers of children that were then working in the factory and was an attempt to improve their living conditions. The result was that many of the first 'public' schools were operated and built by companies running factories. Not

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[17] *Mark Dudek, Children's Spaces (Elsevier, 2005), 31.*

[18] *Ibid., 30.*

[19] *Taylor, Linking Architecture and Education, 10.*

surprisingly these schools were built much like a factory—efficient and controlled. It should also not be surprising that were operated much like a factory floor.

In his book, *Architecture of Schools*, Mark Dudek states that many of the first public schools in England took place in one big open hall.[20] This was mainly due to economics and the lack of more specifically designed buildings. In response, he cites ER Robson in being among the first to determine a better proportioned classroom. The dimensions and layout of the room were designed to support a manageable student to teacher ratio, provide good circulation and visibility throughout the room, allow for good natural light, give the teacher plenty of room in the front for presentations and display, and be sized so the teacher's voice could reach the back of the room. These schools were designed around the pragmatic aspects of communicating lessons and controlling a large group of children.

> *Their internal arrangement has always been the same: classrooms as opaque boxes off long straight corridors purely for circulation and for hanging coats. And though new ideas on education emerged, unrelievedly calling for greater independence among pupils and expressing increasing doubt about traditional teacher-fronted lessons, these never resulted in breaking down the classroom as a self-contained bastion.*[21]

Hertzberger claims that even though many developments in school architecture were intended to breakdown the standard model of education most attempts weren't really effective or never took hold in the mainstream-education system. Jilk counters that much of the problem has to do with a resistance to changing the definition and

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[20] *Mark Dudek, Architecture of Schools: The New Learning Environments (Routledge, 2000), 13.*

[21] *Hertzberger, Herman Hertzberger, 13.*

understanding of 'school.' [22] He presents four stages of spatial development of the classroom[23];

1. "an increase in the number of places by differentiating the rectangular classroom with nooks, ancillary spaces, bays, etc."
2. "the addition of a zone between classroom and corridor which can be used as and when necessary to enlarge the learning area."
3. "the change in the classroom's duty from place of instruction to home base…"
4. "the emergence of a learning landscape where classrooms shrink or disappear altogether."

He begins by describing the standard classroom model as an enclosed space, desk organized in rows, with the teacher in-front and controlling the class. The basic philosophy behind this spatial configuration is to support "the teacher at the blackboard pass[ing] on knowledge."[24] The directional arrangement and proportion of the room focuses the students' attention toward the front of the room—to the blackboard and the teacher. He says "…the spatial conditions of the classroom should mainly serve to aid the pupils' concentration…while the teacher should have the best possible overview." [25] The spatial form of the unarticulated classroom creates great visibility and control and sets up a system of conformity that makes teaching many students the same information very efficient.

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[22] *Dudek, Children's Spaces, 31.*

[23] *Hertzberger, Herman Hertzberger, 36.*

[24] *Ibid., 23.*

[25] *Ibid.*

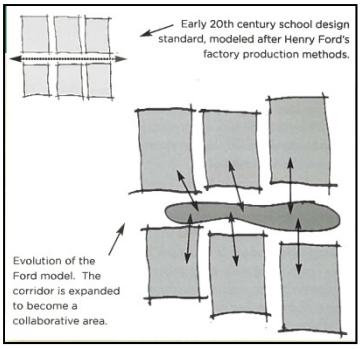

Figure 1: Factory Model as illustrated by Prakash Nair and Randall Fielding. 2009.

Articulation

The first attempt to break down the enclosed classroom was to begin articulating the space inside the classroom. This can be seen in early Montessori schools in which the educational philosophy is to encourage children to learn by engaging in a variety of activities. Many of the activities are individual and self-directed so the classroom needed to support many activities at once. This created the need for some manner of division of space within the classroom. The level of variety and separation of activities determined the level articulation necessary. "An articulated space [in contrast to the unarticulated space] is less easily surveyable and provides more places for different groups or individuals to engage in different activities simultaneously in a room without being unduly distracted by others."[26]

[26] *Ibid., 24.*

Figure 2: Montessori School, Delft, Netherlands. Hertzberger, p. 31.

Expanding into the corridor

The evolution of the classroom eventually led to expanding the space of the classroom into the corridor. Transition of the cold, empty, and boring corridor into habitable space stemmed from the need for greater surface area and space for education confounded with decreasing budgets and classroom sizes. Hertzberger contends that the catalyst to occupying the corridors was money. Budgetary constraints began limiting the amount of classroom space per student which pushed teachers to adopt unused spaces. This process began with simply putting desks outside the classroom door, continued by actually creating spaces in existing corridors, to opening up ancillary rooms along the corridor to make more usable corridor space. In new school design this desire for more corridor space conflicted with government bureaucracy and the need to program spaces for accounting purposes. There is a government/economically driven expectation to increase the 'teaching space' (i.e. the classroom) while decreasing the ancillary spaces such as circulation.

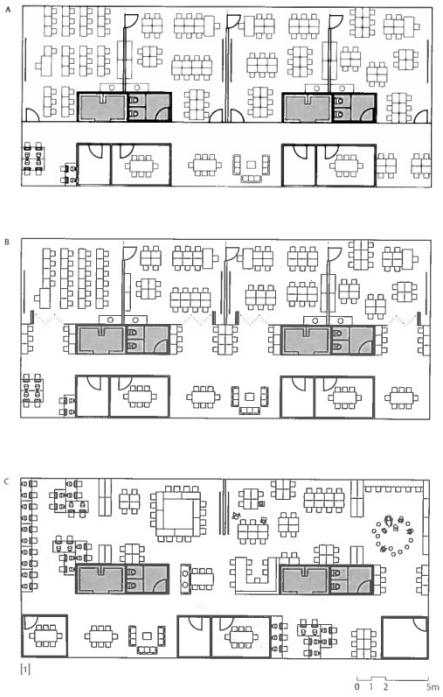

Figure 3: Evolution of corridor space. Hertzberger. 2008.

The development of these corridor spaces has created a new model for educational spaces that design un-programmed or non-functional space into school design. So much so that "slowly but surely the corridors are being enlisted so that the teaching-learning territory is coming to occupy the entire school."[27] Hertzberger claims that it is really these kinds of spaces that we are looking to drive a new paradigm for school design but will need to break "…through this economy-driven system of standards [so] that a more efficient use of space, one more responsive to today's challenges, can be achieved."[28]

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[27] *Ibid., 25.*

[28] *Ibid., 45.*

Adopting the corridor spaces initiates a design principle that creates more varied spaces that have a threshold like spatial quality that allows them to be open, unbound, but be defined as distinct spaces. "The main thing is to make the greatest imaginable number of workplaces and make them as differentiated as possible. That will give you a building equipped for education, that is, in the wider sense of learning." [29] These multifaceted, differentiated learning spaces in an open environment are desirable because they accommodate for a large variety of aptitude levels, create more individual or small group learning, and help to deal with decreasing supply of teachers. This space can exist as a porch of sorts, allowing students to work outside of the classroom but still within the boundaries of the home. This creates a different type of working condition that is more independent than being inside the classroom but allows for connection, spontaneous or otherwise, with students from outside the classroom group.[30]

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[29] *Ibid., 42.*

[30] *Ibid., 51.*

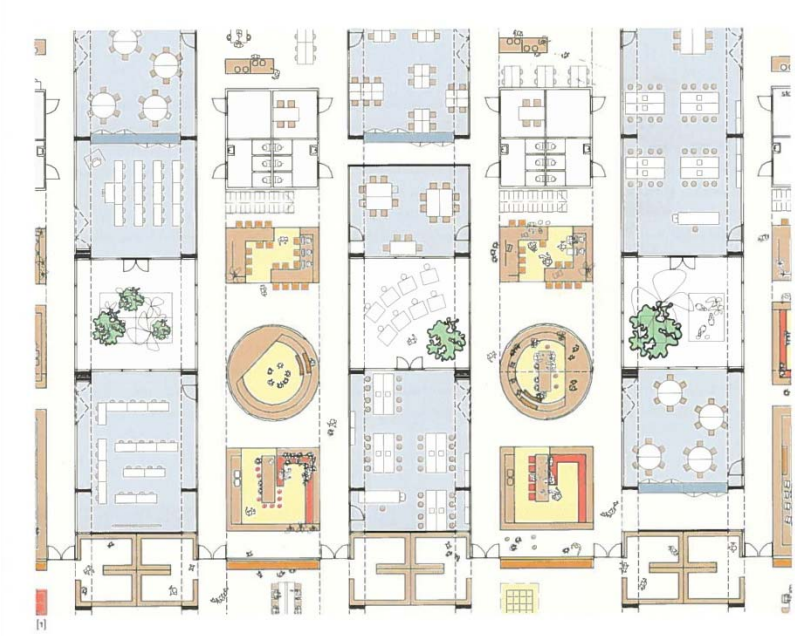

Figure 4: Plan of school with corridor as functional zone. Hertzberger. 2008.

Home Base

The classroom has also evolved from being a home in which the student spent the whole day to more of a *home base* to which the student returns throughout the day after attending other activities or classes in other rooms. As schools moved to become more open and developed specialized activity rooms, there became a need to create a sense of rootedness for the student. Spending much of their day moving from room to room can be disconcerting, especially, for primary school children. As a result, attempts are made to develop the class room as a place to call home and give them some sense of more intimate belonging. "This place should be something of a *nest* from which you take off and to which you keep returning."[31] This concern is becoming even more relevant today as schools continue to open up or even erode the

[31] *Ibid., 35.*

classroom. A school as an open, spatial continuum may make sense for highly technology-based and mobile population but it erodes the feeling of home base. Hertzberger suggests, though, that the development of such a space can have an advantage over the single classroom model. In that, "the feeling of safety and homecoming [in traditional primary schools] depends on the nature and at times the mood of [the] teacher."[32] The importance of this feeling of security is important keep in mind as the argument for a more radical and open school design is developed.

> *"Not everyone is equipped to stand alone in a world rife with opportunities, challenges, and surprises without having a recognizable and familiar smaller unit where they have a sense of belonging. To satisfy this spatial condition is a new challenge for architects, one that may give entirely different shape to the idea of a home base if the classroom were to disappear entirely."*[33]

Learning Landscapes

There is an expectation that ultimate adaptability and flexibility will lead to ultimate freedom (therefore, possibly, ultimate creativity and learning). As a result, the desire to create more and more flexible and open spaces led to the exploration of spatial concepts such as the Open Schools and the Learning Landscapes. The '*open schools'* of the 1950's attempted to simply remove all barriers from between classrooms to create a large open plan school. The 'classrooms' were then created by the arrangement of furniture. This, however, created too much freedom—"spacious, does not mean space"[34]

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[32] *Ibid.*

[33] *Ibid., 36.*

[34] *Ibid., 60.*

Learning landscape design creates distinct spaces that are open freely from one to another. In this spatial model the whole landscape—school—becomes the classroom. This model, Hertzberger suggests, is much like a Montessori classroom with many different zones for different types of activities but in a much larger space. The idea is similar to the Open-School concept except that it supposes some definition of space even though the only dividers might be lightweight partitions. The idea is to create a space that can support a wide variety of uses at one time and be able to evolve over time, even from day to day. The struggle for the architect is establish some sort of structure within which the teachers and students can adapt the space to their needs.

> *The preference is to mark off compartments with freestanding components…to preserve an element of uncertainty. Flexibility is the spatial equivalent of freedom; freedom not to have to fix anything remains an irresistible illusion and gives the impression of having conquered time. Spatial cohesion is an absolute must.*[35]

Here Hertzberger is warning of the difficulty of providing for absolute freedom and adaptability while also providing an organization and structure to create a supportive environment. He argues that this challenge is about creating an unchanging frame work that can adapt to different situations without having to change itself."[36] It is what he terms a *polyvalent spatial ordering principle*. This is easier said than done, however, and so adaptability and flexibility in the spatial configurations combined with the free-form curriculum places a huge burden on the teachers and students to constantly define their environment.

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[35] *Ibid., 58.*

[36] *Ibid.*

Learning Communities

In effort to develop such polyvalent spaces some schools are designed with the concept of learning communities. These communities began as a small grouping of classrooms that would share a common space. As shown in Fielding-Nair's diagram of the finger plan (Figure 5), the classrooms are arranged around a widened circulation path, which creates a series of smaller communities in the school. The grouping allows for a more efficient use of the common spaces and other facilities but, it also represents a more toward creating more connection between the individual classes. This model breakdowns the boundary of the classroom but maintains a need for the more traditional classroom space.

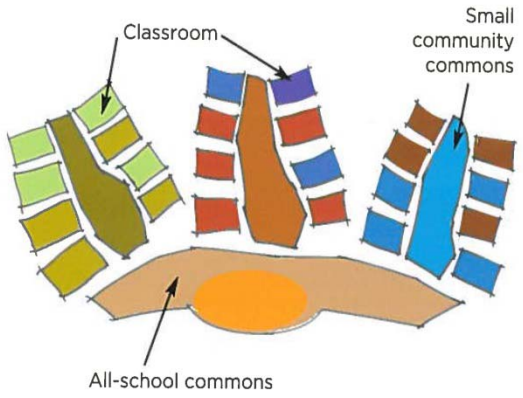

Figure 5: Finger Plan. Fielding-Nair, p. 27

By redefining the classroom as a studio that is akin to the articulated classrooms of Montessori, the learning community can become a series of learning studios that are grouped around a common learning space (Figure 6). The model recognizes the need for an open learning environment that contains a variety or work spaces and recognizes the need for some closed small group spaces for more focused work. The

learning studios provide much of the same benefit as the Montessori classroom by allowing multiple activities and types of learning but it still lets that teacher have good supervision over the entire class.

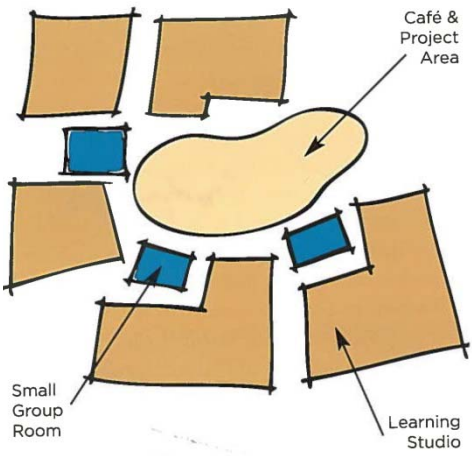

Figure 6: Studio-Based Small Learning Community. Fielding-Nair, p.34.

Economic constraints are creating an ever increasing shortage of teacher. The need for redefining that classroom then goes beyond pedagogical needs and becomes an even more necessary exploration. With a shortage of teaching staff it is difficult to imagine using the traditional classroom model and create a diversity of learning opportunities. Fielding-Nair proposes the "21st Century Model" (Figure 7) as a way breaking the classroom barriers, creating a mixed population of students, and make efficient use of teachers. The learning community in this model is series of workspaces and rooms that are all part of one community. The openness provides that teachers with a good view of the work and, by sharing the student load teachers are able to engage with students in a larger variety of activities.

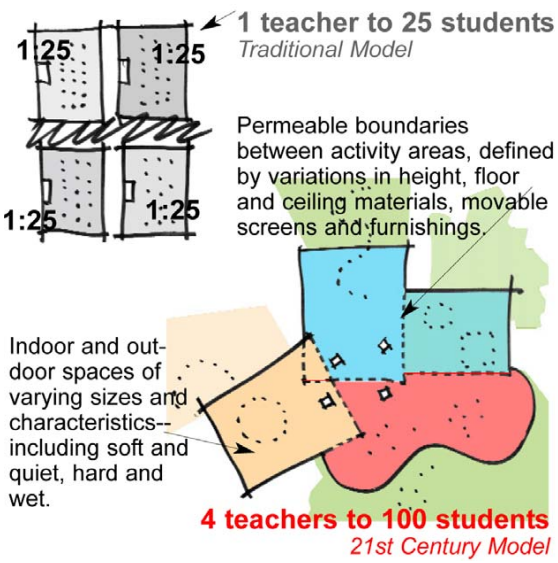

Figure 7:21st Century Model of a learning community. Fielding-Nair International.

Pedagogical Models

This trajectory of change in school design shows a movement toward a more open and dynamic schools. These changes correspond to many new theories about education. These theories provide examples of pedagogical desires to break away from the Factory Model of Education. There are many examples but there are three that seem most applicable to this research; Montessori, Waldorf, and Reggio Emilia.

Montessori schools were first created by Maria Montessori in 1907. Montessori was educated in child education and developed her own theories about how children learn based on many years of observation. She concluded that children, and adults, learn best when their education is made up of exploration, engage with the physical environment, and is somewhat self-directed. She believed that a school should involve a specially designed space with learning materials available that are relate to the children's age and stages of development.

Montessori schools, as a result, are designed to create many levels of interaction between children, teachers, and manipulatable learning materials. The development of the articulated classroom, as Hertzberger explained, enabled a much richer environment that encouraged this type of learning. By creating a series of spaces within the classrooms and by breaking down the distinction between classroom spaces and not-classroom spaces, these schools start to push the boundaries of where 'learning' should happen. They start to breakdown the idea of the classroom as something distinct from other parts of life.

The Waldorf schools also show a move away from the standard educational model. The first Waldorf (also known as Steiner) School was started by Emil Molt to provide education for the employees of the Waldorf-Astoria cigarette factory in 1919. The school was based on the educational philosophies of Rudolph Steiner. Steiner believed that education is about learning through individual development that balances rational thought, spiritual development, and creative endeavors.

The classrooms of the Waldorf Schools are generally simple open-plan rooms that allow for a variety of activities. There are some that vary the shape and size of the rooms based on the grade level of the students, e.g. smaller and more round rooms for the younger ages. The rooms are filled with various types of furnishings and materials that create spaces with different experiential qualities and functions.

The Reggio Emilia schools are also based on the idea that education is an individual experience. The Reggio Emilia philosophy contends that the student is the constructor of knowledge and that it is the teacher's or the school's role to support them. The

belief is that learning must happen differently for each child. Loris Malaguzzi started the school in Italy after World War II in an effort to counter what he saw as a degrading society. He argued that children had hundreds of languages and they needed to learn their own ways.

He believed that the teachers, parents, and the school building were all important for helping the child learn. The school environment should create a place of exploration that would speak to the many languages of children. As a result, Reggio Emilia schools are often designed with many types of spaces. The materials are often rich and chosen for their ability to invoke creativity and feeling. There are often different sizes or levels of spaces to create different kinds of relationships between people and between spaces. This school focuses much of its attention on allowing children to develop their creativity and own ways of thinking.

These three alternate education models, as well as many others, all show a trend toward more creative and individualized education models. They show a strong recognition of the power of the architecture to support and encourage these ideas. In some cases, such as the Open-schools, the architectural ideas were not strongly related to pedagogy. In others, such as the Open-air schools the ideas only show a first step in moving away from the traditional models. The desire for a less rigid and more engaged and creative environment, however, is obvious.

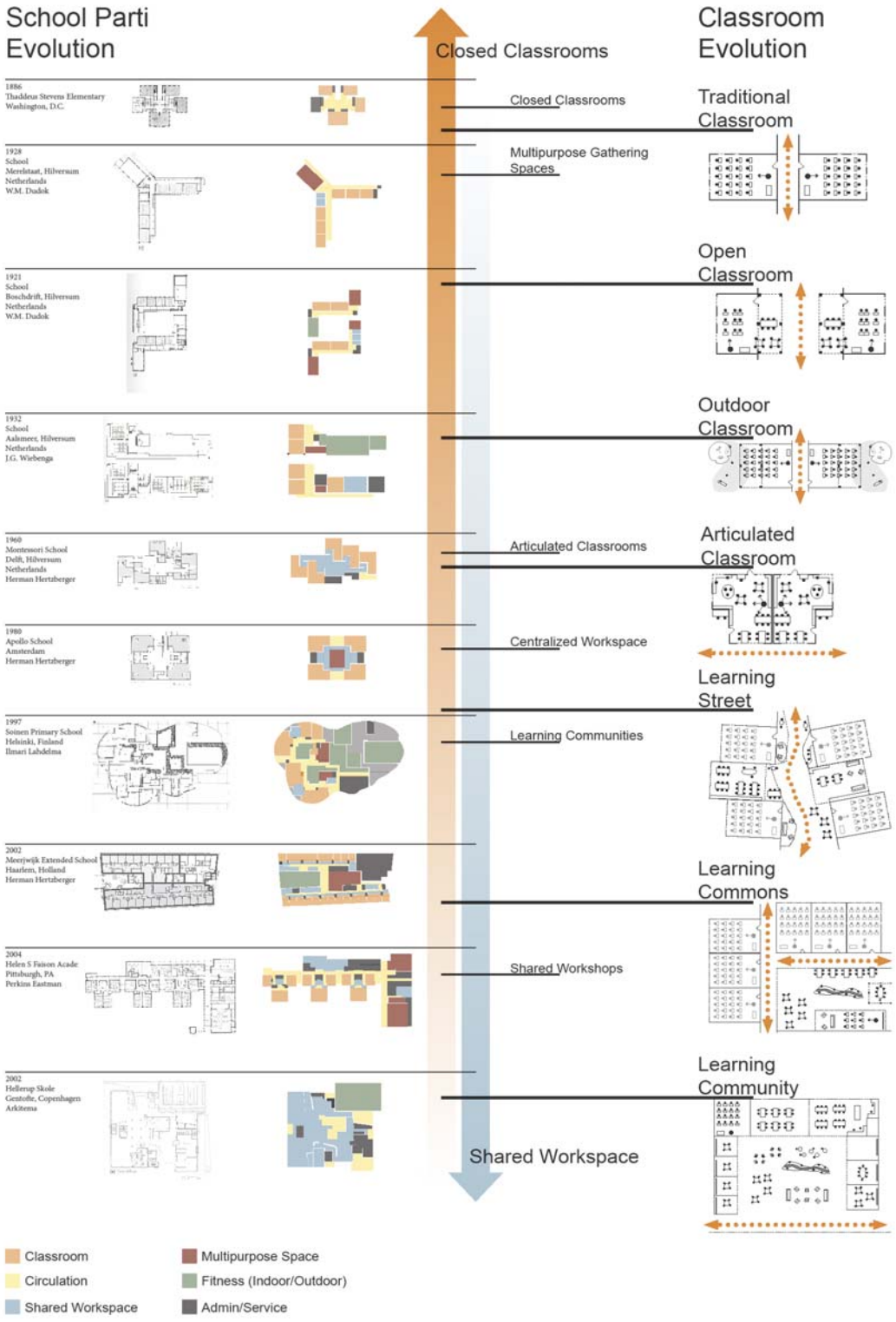

Figure 8: Chart showing evolution of schools from closed classrooms as dominant spaces to shared spaces.

Some of the ideas of from the various educational theories as well as some of the architectural responses are finding their way into public school systems. These efforts are further evidence of the seemingly subconscious need for more individualized and richer schools. The problem is, however, that schools are still being designed using the traditional model as a template and then modifying the design (like putting glass walls to improve connectivity or scattering creative gathering spaces around) to try to break the traditional model. This is much like trying to redesign a building that was a Pizza Hut to like a Mexican Restaurant. The underlying original assumptions about education are still visible. What needs to happen instead is for the process to be inverted so that the first intent is to design for curiosity and wonder, and then to adjust the spaces meet the needed program.

Once we have re-prioritized the classroom from being the most important school space to being one of many necessary functional spaces in a school, we must then try to imagine what other priorities or boundaries may be reconsidered. I propose that it is the concept of the school as an isolated world that must be confronted. To test this, I believe it is possible to design a campus that combines both school and work into one comprehensive learning environment. Using the idea of learning communities and shared facilities these two programs can be put together in way that offers a connection of ideas, people, and methods but still allows each to have its needed separation.

Such an environment would need to be designed to attract collaboration, whether planned or spontaneous, and create connections, both subtle and direct. This

environment would prefer curiosity and wonder over function and efficient space use. The environment would focus on teaching creativity and critical thinking and allow for a range of pedagogies and curricula.

Chapter 2: Learning Theory and the Design of Spaces

Philosophies of Learning

The process of designing a school must begin with a clear understanding of the underlying assumptions about learning theory that are present in the current public school model. From the basis it should then be possible to develop the assumptions that should found the next evolution of school design. These assumptions lie in the theories of how knowledge is acquired and what is needed to make it happen. The common view of the school system seems to disregard the importance of the architecture—except for the functionality of the building—in the role of developing young minds. It is really that"…the physical environment of the school has become nearly invisible to teachers and families in part because it is so familiar; basic school design has not changed in one hundred years (Brubaker, 1998)."[37] The result is so many schools built with only durability and functionality in mind. These buildings are, as Taylor argues, built to "…support **passive learning**"[38] This is unfortunate because the building has enormous potential to teach.

The passive learning approach indicative of many schools expects that teachers teach and students will soak up the knowledge. The reality is, however, that "learning does not occur in a vacuum or by rote memorization, but through a process of immersion

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[37] *C. William Brubaker, Planning and Designing Schools, 1st ed. (McGraw-Hill Professional, 1997); Taylor, Linking Architecture and Education, 41.*

[38] *Taylor, Linking Architecture and Education, 27.*

in complex, rich environments." [39] The theory of Brain-based education looks at the neurological processes involved in learning to evaluate when learning is most effective. The results focus on three learning states;

1. orchestrated immersion
2. relaxed alertness
3. active processing

These three states start to paint a picture of an environment that seems rather different than many of schools across the country. In an environment that truly expressed the ideas of the Brain-based learning the student would be actively engaged in activities, surrounded by objects and spaces that are captivating and wondrous, and the student would feel comfortable and in control of his/her day.

The difficulty with creating such an environment is that the proper spatial response that produces these three states differs from student to student. What one student may find very interesting will be either uninteresting or really confusing to another. This isn't just a matter of subjective preferences, though, it stems from the idea that people have different abilities or aptitudes. As Howard Gardner, in *Intelligence Reframed: multiple intelligences for the 21st century*[40] argues, intelligence is one type of ability and it manifests itself in many different ways for each person. Gardner categorizes intelligence into nine categories; Verbal/Linguistic, Logical, Visual/Spatial, Bodily/Kinesthetic, Musical/Rhythmic, Interpersonal, Intrapersonal, and Naturalistic.

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[39] *Renate Nummela Caine and Geoffrey Caine, Making Connections: Teaching and the Human Brain (Addison-Wesley Publishing Company, 1994), 5; Taylor, Linking Architecture and Education.*

[40] *Howard Gardner, Intelligence Reframed: Multiple Intelligences for the 21st Century (New York, NY: Basic Books, 1999).*

Recognizing the diverse perspectives involved in multiple intelligences, presents the idea of a very diverse range of spatial/architectural responses that would connect with persons of differing intelligences. Taylor presents the following table as set of examples for how one might design to respond to Gardner's Multiple Intelligences Theory (Table 1)[41]. The list is helpful to develop a better idea of how spaces can respond to a wide variety of students.

[41] *Taylor, Linking Architecture and Education, 152–3.*

Multiple Intelligences Theory (Gardner, 1983,1999)

	Definition	Environmental Support
Verbal/Linguistic	thinks in words sensitive to language	signage in multiple languages theater multimedia comm. center
Logical	approaches problems logically numerical	patterns in walls/floors structure exposed technology geometric form
Visual/Spatial	sees visual world accurately thinks in 3D	variety of spaces sculpture wall graphics galleries for art hallway museums windows and interior views
Bodily/Kinesthetic	uses body to sense environment communicate and solve problems	fitness trails dance studios objects to manipulate
Musical/Rhythmic	sensitive to nonverbal sound can create and appreciate music	acoustics big concern music practice space performance space
Interpersonal	sensitive to feelings of others	movable furniture teamwork space large work surfaces gathering space indoor/outdoor conference rooms
Intrapersonal	sensitive to own feelings	outdoor seating Study alcoves Private areas

Figure 9:Multiple Intelligences Theory and examples of architectural responses.

Content-Centered vs. Student-Centered Education Models

It isn't enough, however, to only consider the variety of intelligences and ways of thinking in the student population. The ideas must also be folded into the many modalities of learning. This requires recognition of a variety of ways that knowledge is acquired—learned. For the purposes of this research, the basic theories of knowledge acquisition are simplified into two categories, Content-Centered and Student-Centered models.

The Content-Centered model is based on the assumption the knowledge is a commodity of sorts that can be passed from one person to another. This is the model on which the traditional school is based. The teacher possesses or has access to the knowledge and is able to transfer it to the student through discussion, lectures, etc. In this model there is no recognition of individual knowledge—"knowledge exists objectively, independent of the learner."[42]

In the Student-Centered model, there is a belief that knowledge is personal and individual. This requires the student to interact, interpret, and experience to learn. This model contends that knowledge cannot be simply passed from one person to another. It only becomes real knowledge once an individual internalizes and understands in her own way.

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[42] *Ibid., 41.*

It is easy at first, to decide which model of education you think is the most 'true.' It might be tempting to argue, as the public school system has for many years, that knowledge must be quantifiable and verifiable. Schools, therefore, should focus most of their attention on passing on as much information as possible to make students an effective part of society.

It also might be tempting to promote the Student-Centered Model as the 'true' form of knowing. One might argue that simply assimilating and regurgitating facts is not knowing—it is only remembering. To truly learn, a student must come to his own conclusions through experience and reflection. In this way, a person will have a deeper and more real understanding of the subject matter.

The reality is likely more a combination of both. The content-centered model is necessary because it is difficult to argue against the idea that there is a base set of knowledge or skills that one must learn before learning many concepts on their own. The Student-Centered model, on the other hand, seems to be much better at teaching students concepts and actual application of facts and information, and does a much better job of developing critical and creative thinking abilities than a lecture type environment.

Taylor recognizes a need for both types of learning in a school environment and uses these two learning models to establish a basic epistemological grounding for five "Philosophies of Thinking"[43]—Idealism, Realism, Experimentalism, Ecoism, and

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[43] *Ibid., 41–7.*

Existentialism. She follows up categorization with examples and suggestions on how to express these types of knowledge architecturally.

Idealism – Plato

The first two philosophies fall under the Content-centered model. They both contend that knowledge is universal but believe that it comes from different sources. The Idealist philosophy believes that knowledge exists independently and in a 'pure' form. Taylor connects this with Plato's philosophy. Plato argued that we all once had true knowledge but once our soul was put into our body we forgot what we knew. In this way learning is really just us remembering. Taylor says that, *"Idealist* seeks to transcend environment to reveal absolute ideas behind objects."[44] The Idealist's environment is "a world of mind and ideas."

This is represented by the standard intellectual/academic idea of learning.
The standard educational model is, then, founded on the idea the teacher's role is to bring students in contact with these 'pure' ideas and help the remember.
The architectural expression of idealism, Taylor explains, "Appreciat[es] the richness of the world of Ideas and symbols."[45] A design goal for this philosophy is to "convert the book oriented atmosphere into an aesthetically pleasing 3d textbook…"[46]

Idealist precedent

Museums, libraries, universities, and churches

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[44] *Ibid., 42.*

[45] *Ibid.*

[46] *Ibid.*

Historic styles and classic architectural proportions

Idealist process of translation

"physical object to the idea or concept"

"microcosm to macrocosm"

Objects with "rich, evocative qualities"

Idealist design potential

Platonic forms

"microcosm of larger historical world"

"golden mean, symmetry…"

"graphics and spaces to suggest storyline"

"all-encompassing theme to organize design elements"

Realism – Aristotle

The Realist also believes that knowledge exists objectively but that it is to be found in the world around us. Taylor uses Aristotle as a progenitor of this philosophy of knowledge. Aristotle believed that knowledge was to be found in things themselves and that we could access it by examining the world around us. The "*Realist* discovers the essence of environment and its patterns through nature, the senses, and reason."[47] Theirs is a "world of matter." The environment that supports the Realist philosophy is a "multisensory, logical environment." This is an environment that is based on the scientific method. Students learn by investigating and probing. Such an environment should be designed rationally and logically but stimulate all the senses. The school may have spaces that are more like a "naturalist's museum" than a traditional school.

Realist precedent

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[47] *Ibid.*

Natural history museum and the natural world

Realist process of translation

Perception to reason

Objects – “tangible, sensory qualities and…natural patterns”

Realist design potential

Use building materials to show texture and structural properties

soft and hard play areas

museum-like displays

Playground for multisensory experiences

Building systems to show relation to body systems

Experimentalism – Dewey

The Experimentalism philosophy is part of the Student-Centered model. The belief is that knowledge must come from personal experience and interaction with the world. Although, it is also based on the ideas of the scientific method, it values an individual, subjective knowledge over the idea of independent, objective knowledge. Taylor uses John Dewey as philosopher who espoused this philosophy. Dewey’s belief in education was that it could not be separated from real life. It is not something that is apart from our everyday existence and neither is knowledge. In this way, Dewey argued that education should be about learning by interacting with the world and developing and understanding of the connection between all parts of life. Taylor says that “*Experimentalist* experience the environment, testing and retesting phenomena through problem solving and the scientific method…Constructing meaning through

hands-on experimentation…"[48] It is a "a world of human experience." This type of environment should allow for individual exploration, participation, flexibility, and user adaptation. Learning is in groups of students differing in size based on the project. "Process appears to be at least as important as the end result."[49]

Experimentalist precedent

studios, workplaces, parks and urban settings

Experimentalist process of translation

interaction leads to experience, iterative process

objects – "potential to be manipulated in a variety of open-ended ways"

Experimentalist design potential

multi-purpose, flexible, and creative use of space with "different activity settings."

"encourage interdisciplinary learning."

"Use the total volume of the space."

"…storage to facilitate constructivist learning"

"multiple forms of lighting"

theme of change in design—theatrical set design

Ecoism – Thoreau

The Ecoism philosophy, though not actually a system of epistemology, is important because it is a belief about how need to understand the world around us, especially the natural world. The philosophy views the world as a network or ecosystem in which everything depends on everything else. There is embedded in this form of

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[48] *Ibid.*

[49] *Ibid., 44.*

learning an understanding of how to teach children about systems and the logic of networks. To be consistent I assigned this philosophy to Henry David Thoreau. He is well known for his beliefs and writings about nature and man's connection to the environment. He believed that our true place was to be deeply connected and involved in nature. Ecoism is not really a philosophy about how we know it is really about what we should know. Taylor calls this a "world of interdependencies and belonging." An environment that teaches with the Ecoist philosophy has a strong connection to the outdoors and will likely blur the boundaries between in and out. The goal should be to incite interest in the natural environment and give great views and perspectives of the processes of life. In this type of school "groups move freely from indoor learning to outdoor locations and back again…"[50]

Ecoist precedent

the earth, habitats, ecosystems, cycles, networks, and green architecture

Ecoist process of translation

"connections between objects and the self, and we build networks, systems, and interdependencies."

Ecoist design potential

siting, wind power, and solar orientation

systems for water harvesting

"links to the outdoors…"

agriculture and associated life skills

"habitats for students to observe and maintain…"

design for student care and stewardship

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[50] *Ibid., 64.*

"local materials and vernacular building and landscaping techniques."

Existentialism – Heidegger

Existentialism as a learning philosophy is about pure subjectivity and relativity. It holds that learning is really about learning about us and our own existence. Taylor uses Martin Heidegger as an example of this type of philosopher. Heidegger, in a similar manner, as the other Existentialist of his time, believed that knowing was really about us and our existence. Knowledge for him was individual and relative to each person's existence. In fact, he even argued that knowing about things or phenomena was secondary to us understanding our place in the universe. Existentialism, then, leads to an environment of reflection, self-awareness, and contemplation. Spaces must be designed to allow for individual exploration but also to create contrasts between the self, others, and spaces, thereby, prompting thought about the relation between elements and ourselves. Taylor explains that "*Existentialists* choose which meanings to attribute to the world through intuition, self-awareness, choice, and responsibility." This philosophy completely ignores any notion of objective knowledge that can be transferred from person to the next. This is a "world of self-choice." Learning in this way teaches student awareness of themselves, their responsibility to others, and about consequences.

Existentialist precedent

modern art gallery, theater...places that challenge tradition

guiding design concept for the Existentialist environment

"child or client is a powerful chooser."

Existentialist process of translation

"subjective and constantly evolving through a process of personal choice."

objects – “support individual choice, creativity…expressive qualities”

Existentialist design potential

multiple levels in one classroom—personal autonomy, student to adult eye-contact, self-selection of spaces

“displays/galleries for student work.”

“scatter quiet areas for privacy…”

mirror environments

“personal areas for each individual”

“can support multiple simultaneous activities”

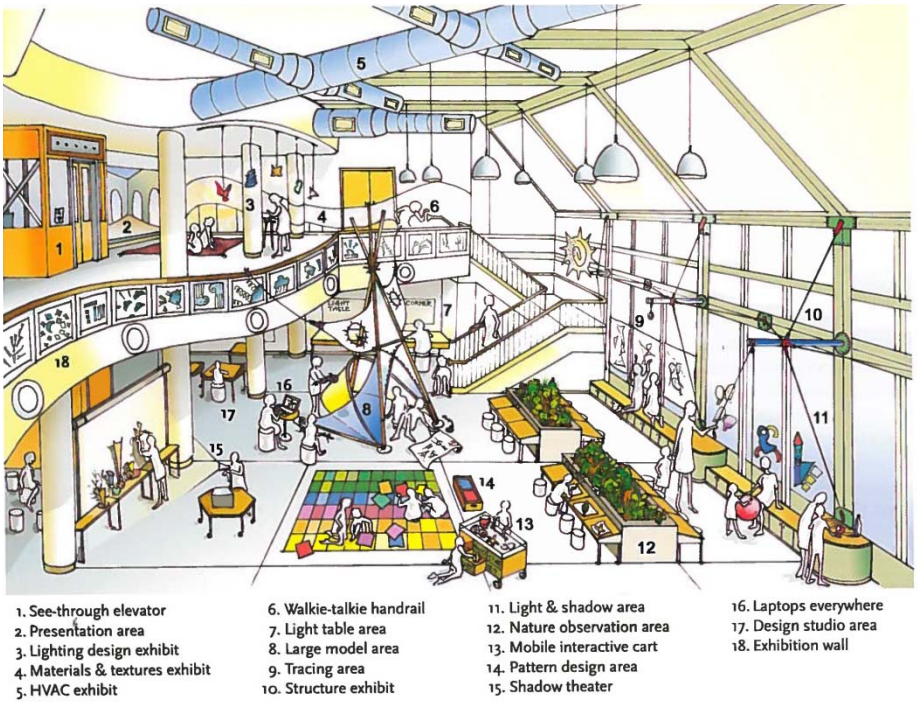

Figure 10: Illustration, showing a diagrammatic representation of an environment supporting multiple learning styles, philosophies, and student-centered learning. Taylor, p.46.

New Models and Philosophies of Learning – Learning for Life

Imagine an environment in which all the students were immersed in very enriching situations, relaxed, and actively engaged. The learning space would also be subtle blend of teacher led activities and discussions, and student directed explorations. Throughout the architecture would support the learning by offering cues and spatial configurations that held meanings that were at once obvious, deep with meaning and potential, ambiguous but distinct, and made students feel at home but curious to explore the constantly evolving space around them. This may sound like a fun dream and, it some ways, it is a fantasy. It is an important dream in that it asks the question of why aren't schools like this. It is of no small consequence how our children's environments are shaped. "The quality of the environment affects the quality of learning."[51] Taylor asks these questions;

> "How might we characterize qualities of legibility, the importance of the thinking and individual interacting within a rich environment, and the functioning of the brain/mind?"
>
> "How can our environments reflect order in the universe?"
>
> "How can we build these concepts in to the very structure of our schools?"

It seems unlikely that the answers to these questions will be found in the standard school model. (Although, there may many clues to be found in the ways the users have adopted spaces that they found to be insufficient.) On the other hand, there are

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[51] *Ibid., 25.*

many places the children and adults learn—are educated—and seem to be relaxed and have fun. Three such examples that will be explored are Children's Museums, Nature Centers, and Cultural Centers.

Children's Museums

Museums of any sort are a wealth of information. Children's museums, however, teach in a very different way than other museums. They are highly interactive, asking the children to push, pull, make something, touch something, climb through something, etc. They are very successful at being able to draw children into a topic. The graphics and displays are of very high quality. There are often many rotating exhibits mixed with more permanent and robust exhibits. "The legibility of museum-quality display with negative space around signage, increases clarity and supports perceptual skills essential for learning how to read."[52] They teach, it seems, in the way kids like to learn, by playing. It is likely, though, that a school will need to be much more dynamic and flexible than a museum. H*ow can you mix the rich and inviting techniques of a children's museum with a school curriculum?*

Nature Centers

Nature centers create a space that combines the free-play feeling of a park or playground, the exhibit and teaching centers similar to museums, and variety and display of natural systems. Furthermore, they are often predicated on an idea of stewardship and preservation and may even include children in the tasks needed to

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[52] *Ibid., 28.*

care for the center. Exploration of these spaces and how they relate to large variety of children provides a very interesting contrast to the 'playgrounds' that we all know. *How could an environment like this infiltrate a school and be used to engage the students in constant study of nature?*

Cultural Centers

Taylor contends that "the Ideal educational environment is a carefully designed physical location composed of natural, built, and cultural parts that work together to accommodate active learning across body, mind, and spirit."[53] The focus of cultural centers is, obviously to teach about a certain culture. Often they implore local organizations that are passionate about their culture to preform rituals and performance at the center. They teach through exhibits and lectures as well. Many are known best for their iconic architecture. The architecture is sometimes a literal recreation of architecture from the culture but it is more and more a contemporary interpretation of the historic architecture. When done correctly this is perhaps more powerful than a simple recreation because it draws the visitor by asking them to discover how the building expresses the style or values of the culture. It is possible to imagine that when this is done really well the discovery can be very deep and profound.

It is also of interest to explore is the way in which cultural centers create community and a certain pride to its community. By showing that the history and culture are

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[53] *Ibid., 31.*

valued, the center has the ability to convey a message of reverence for history, community, and ritual. *How can this expression of culture and community be integrated into learning spaces?*

When designing learning spaces we must endeavor to do more than provide a space that is functional. Or, maybe, we should redefine what 'function' really means for a school. The goal should be to develop a special kind of architecture, one in which 'function' means to incorporate all of the learning philosophies and fantastical types of space making into a place that awakens imagination and curiosity, and is imbedded with layers upon layers of information just waiting to be discovered and interpreted.

Chapter 3: Analysis of Learning Spaces

As discussed, the history and trajectory of school design can be seen as a desire to create more open and collaborative environment that attend to the many types of learning that are necessary to provide education to a diverse population. It is also possible to argue that more innovative contemporary environments are being designed to create a more creative and dynamic relationships. By examining precedents of these schools it is possible to derive a pattern of elements and spaces that are becoming more prevalent in schools.

In the following chart (Figure 11), a series of school spaces are categorized based the learning type on which they are based and by the type of function they serve in a school environment. The categories of spaces are creative play, small group, open group, closed group, open learning, and outdoor. Creative play represents a space that is focused more on play through movement or games, instead of school functions. Small group spaces are often open to the spaces around them but provide a partitioned environment that allows for a group of 3-5 people to work together in discussion or a task. Open group spaces are primarily the central gathering spaces or circulation area. Closed group spaces isolate the group from the surrounding area and provide an area for focused group work. Open learning spaces are often larger spaces that can adapt for use by a large group or a range of many sizes of groups. Outdoor spaces are more than just playground or a field, they outdoor learning spaces focused on a connection to nature or, even, a space that is about learning about the natural world.

Further analyzing these precedents as to what type of learning they express gives a better understanding of why the diversity of spaces is created. The spaces use different levels of enclosure to distinguish between content-centered and student-centered learning. In spaces that are used as more traditional classrooms, the sense of enclosure is clear and connection to other spaces is minimal. Spaces that respond to student-centered learning, such as existentialism, the spaces have more ambiguous enclosures and spatial definition that often distort their understanding as conventional spaces.

Materials provide differing levels of engagement with the spaces and learning. Smooth and clean materials are used most in formal work spaces. Natural materials give a warm feel to the spaces. Soft materials, that sometimes mimic nature, are used to create casual environments.

Some of the most interesting are developed by distorting the expect volume or proportion of the spaces, or by creating an unexpected use of the space. For instance, circulation spaces, main stairways, are often used as gathering spaces for spontaneous or work or as auditoriums for large gatherings.

Contemporary Learning Environments: School vs. Work

These develop of spatial types is not unique to schools. An exploration of similarly innovative spaces reveals parallel development in work place design. Creatively inclined businesses such as Google, Pixar, various design firms, etc. show spaces that are almost identical to the types of spaces seen in the school precedents. These spaces

show similar functional spaces and the learning types can be reinterpreted to represent types of work activity.

This correspondence should not be surprising. The traditional model of schools, as previously articulated, was developed as part of a need to train child workers. Although it seems inappropriate to think of schools as training for work, we should think of them as training for life. I contend that major problem with our current education system is not technological or lack expertise or lack interest—it is a lack of connection between the way we teach children to learn and the way they need to be able to think to be successful in the coming world. A desire to repair this divide is evident in many of the new school designs and is on the mind of many designers and education experts. The design of more open and collaborative spaces will help to change the learning model but I argue that there needs to be a stronger move toward integrating the school environment with the changing world. By pairing a school and a variety of workplaces the number of possibilities for collaboration and innovation explodes. Recognizing that both environments are seeking to build similar spaces, the connection allows for a sharing of resources and facilities.

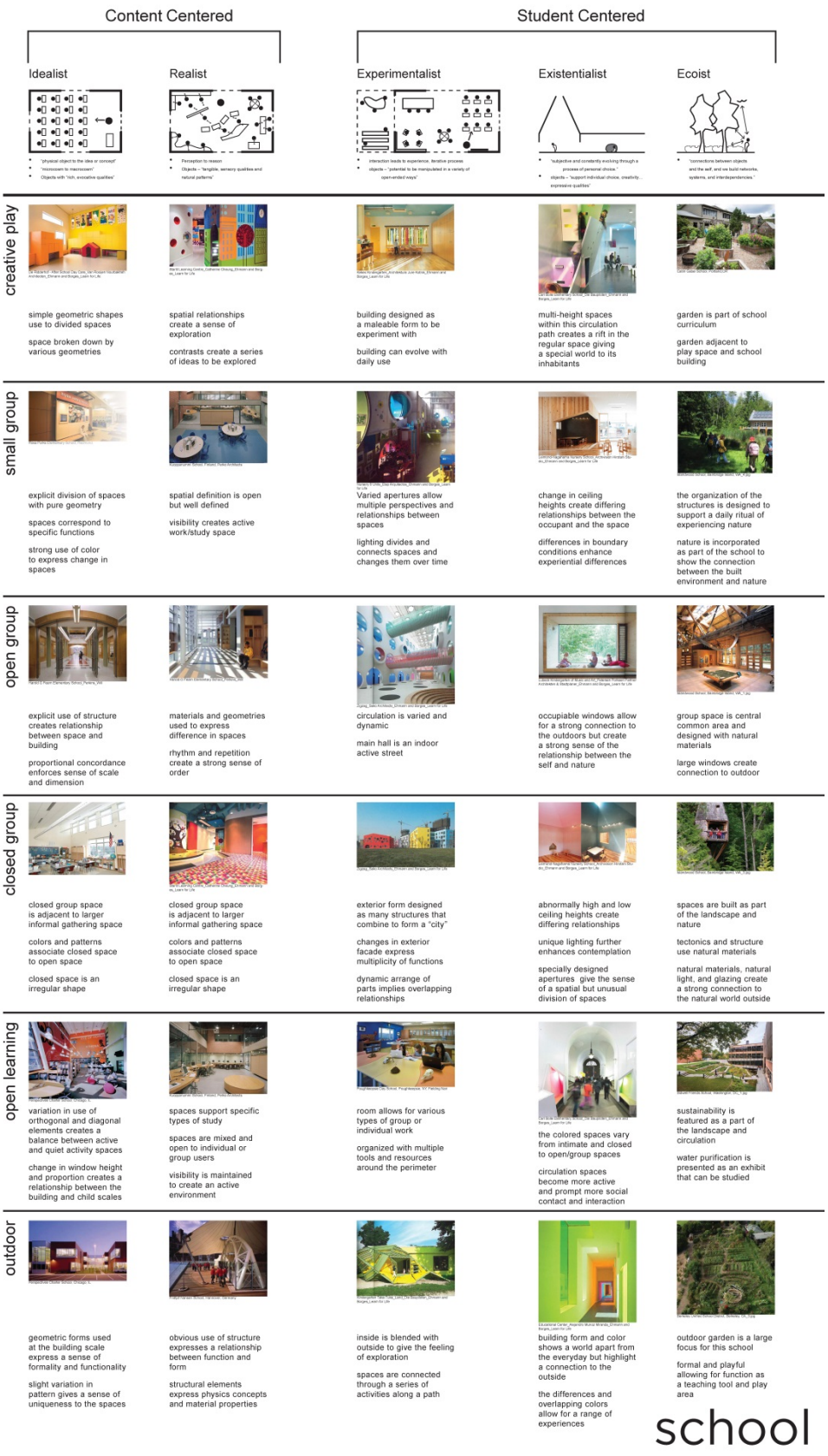

Figure 11: School Precedent matrix showing a series of school spaces organized by learning type and spatial function.

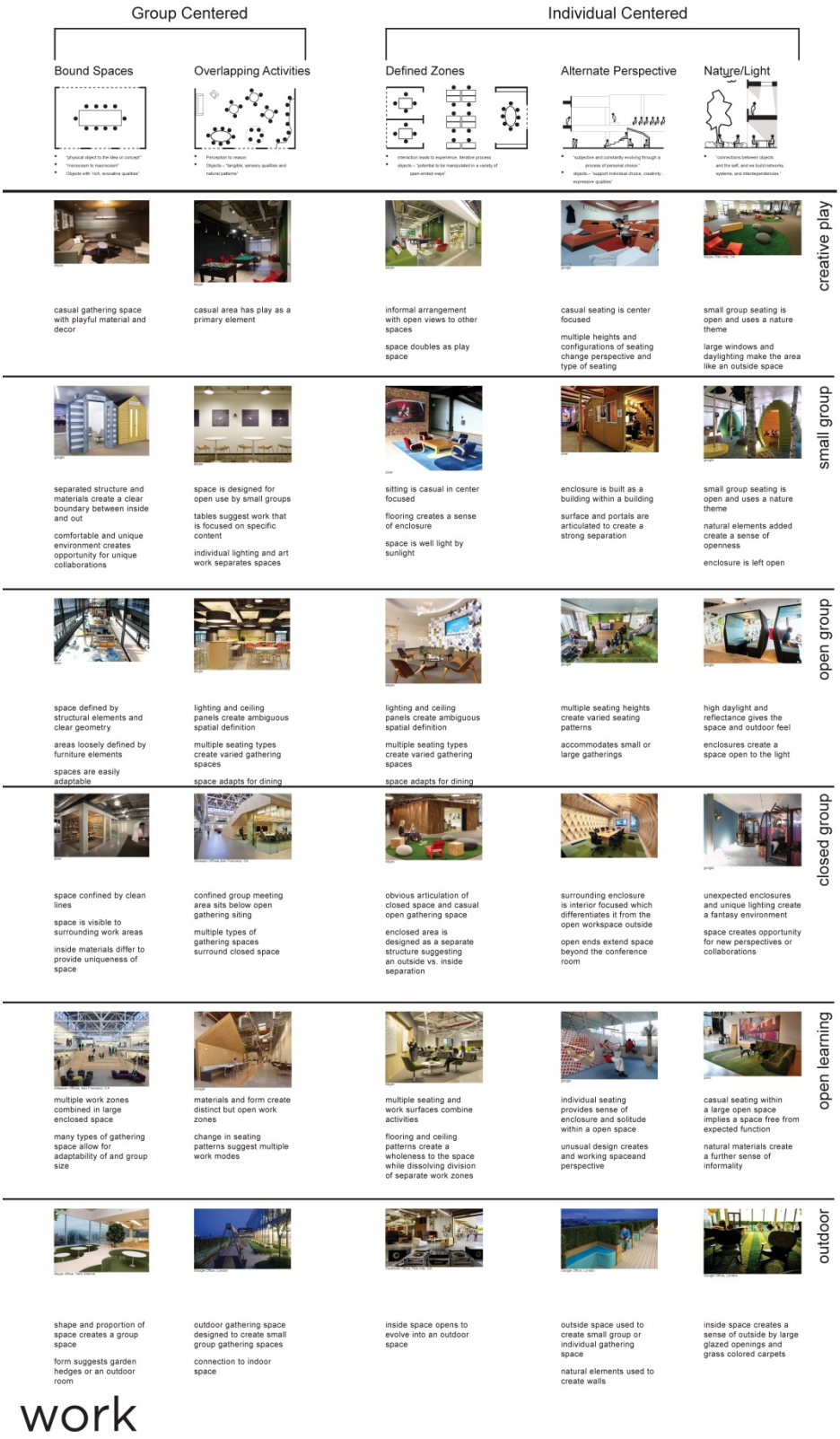

Figure 12: School Precedent matrix showing a series of school spaces organized by learning type and spatial function.

Chapter 4: Designing Educational Spaces

Design Goals

This thesis argues that the next step in educational space design is to dissolve the boundaries of school by integrating a school with a diverse set of work places. To do so, the integration must be more than a simple adjacency or occasional joint events. The environment must be designed to enable and encourage integration at many levels. In contrast, it must enable the function of the entities separately. The environment in which this integration takes place must be about more than functional spaces. The environment must express itself as something other than the world outside. Ideally, the building itself will prompt the integration of the populations and their activities. It will do so by creating a world of curiosity and wonder. This integration is aimed at soliciting a learning environment that is about teaching creativity and critical thinking. These four concepts, therefore, will serve as the design goals for this project.

Figure 13: School work connection diagram illustrating a spectrum of connection.

Curiosity

Curiosity can be defined simply as a desire to learn. The fundamental question for this project then, is what architectural elements help to provoke a desire to learn. An environment of curiosity must be one of subtle relationships, unclear circulation or organization, and create opening for glimpses into spaces or activities.

Wonder

Wonder represents the idea of being surprised or astonished by discovery. To establish spaces of wonder the project must seek to design spaces that are both unexpected and unusual. It must also develop common spaces that have an unusual or uncommon relationship to the rest of the building. For this the project must seek opportunities for dramatic volumes, lighting, and views.

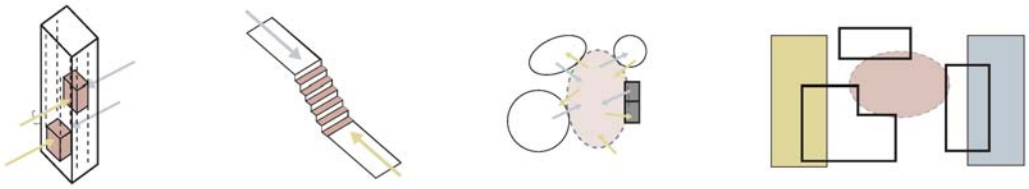

Figure 14: Spontaneous collision - vertical circulation, paths, and common space.

Creativity

Creativity can be thought of as making new connections between known concepts. To create the possibility for these new connections the environment must strive to connect people and ideas in as many was as possible. This will be done through

circulation paths—which will cause unintended mingling of populations, views—which will allow for awareness of many overlapping activities, dramatic use of lighting and form, and use of multiple paths of movement and activitiy.

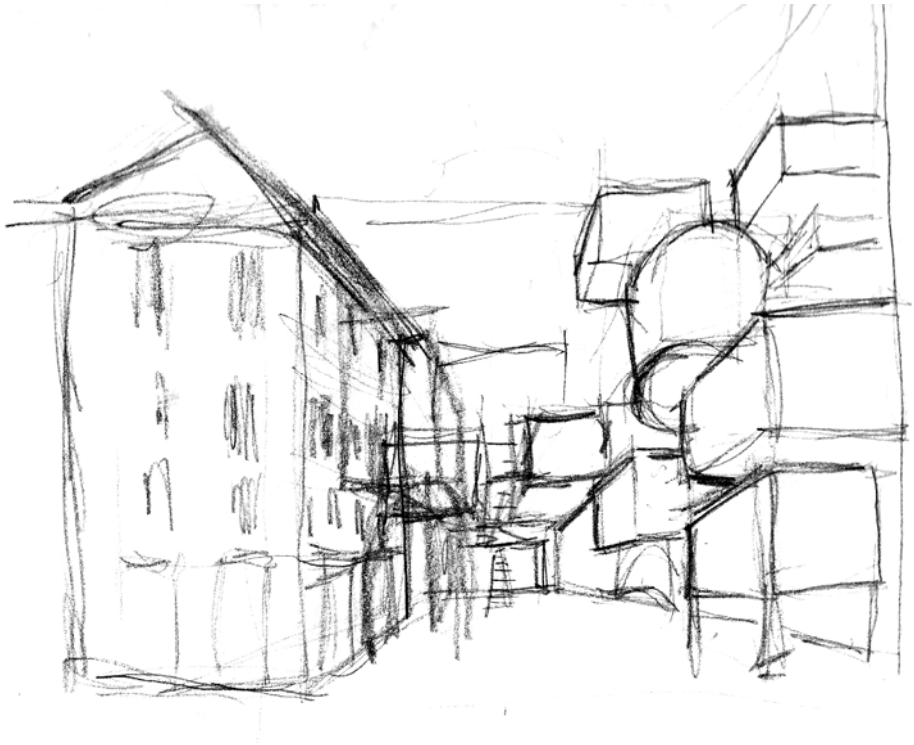

Figure 15: Concept sketch for primary connection space between the old and new structures.

Critical Thinking

Critical thinking, on the other hand, can be thought of as the rational connection between know concepts. The environment must be developed to expose clues to its organization and function. The building's structure and systems offer great promise for such exposure. Putting the building systems and structure on display allows the learners to recognize and consider the many relationships between the parts to the whole.

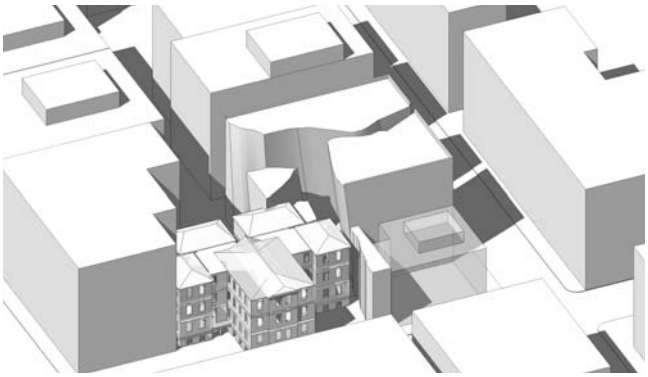

Figure 16: Fissure conept model showing the connection space as fissure runnning through the buidlings.

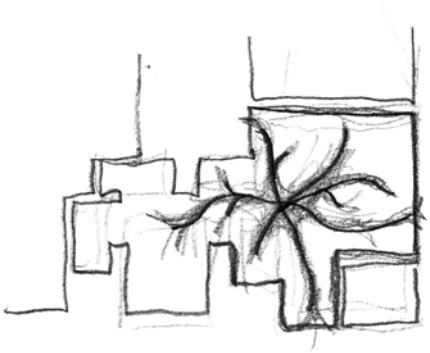

Figure 17: Fissure concept sketch.

Program

The program for the building is to establish a space which will integrate dedicated office space, a K-12 school, and a wide range of shared spaces. The office and the school spaces will be developed as small communities to allow for necessary segregation. These communities will be connected by the series of shared spaces. Establishing the "rentable" space as communities creates a flexible use of the square footage. As the enrollment of the school fluctuates it is possible to rent the leftover community areas to more work functions or possibly charter school functions.

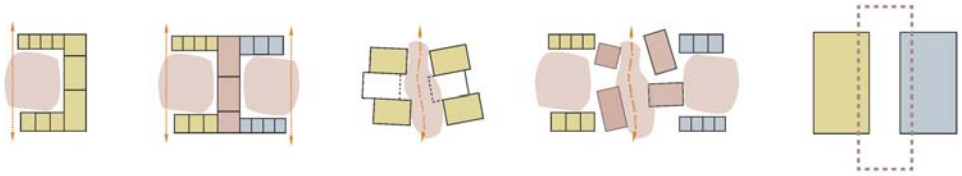

Figure 18: Learning communities to connection between school and work communities.

The shared space is to include common work spaces of different gathering sizes to support multiple tasks. There will also be a large amount of space dedicated to open circulation and spontaneous gathering. Furthermore, there will be a series of large gathering spaces to support many group functions.

Civic Space

The design of the large gathering spaces will be designed as if they were civic spaces of an urban environment. Common gathering spaces of a town hall, plaza, street, park, and playground will be used as concepts. These spaces represent a range of connections from planned meeting spaces to informal gathering, to connection by activity, to spaces based on play and recreation.

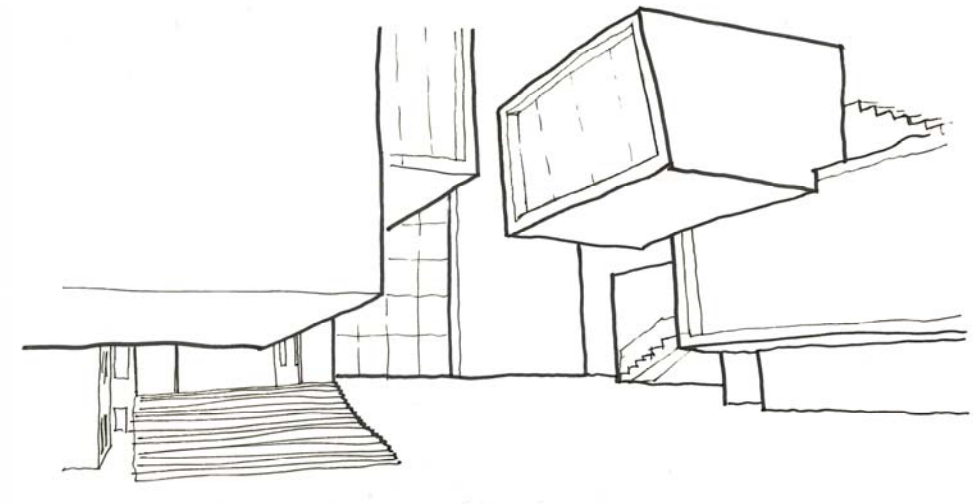

Figure 19: Space concept sketch illustrating the overlapping of spaces and functions.

Chapter 5: Context and Site

The site chosen for this project is the site of the Thaddeus Stevens School in the Foggy Bottom neighborhood of Washington, DC. The site is composed of an existing school that is a historic building and an adjacent lot that is the playground for the school. The school is on 21st st. between K and L St.

Figure 20: Thaddeus Stevens Elementary, east-center facade. Google Earth image.

Figure 21: Thaddeus Stevens Elementary, east-right facade. Google Earth image.

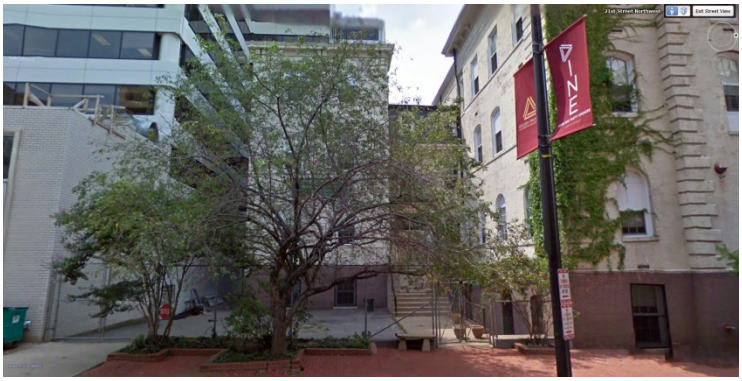

Figure 22: Thaddeus Stevens Elementary, east-left facade. Google Earth image.

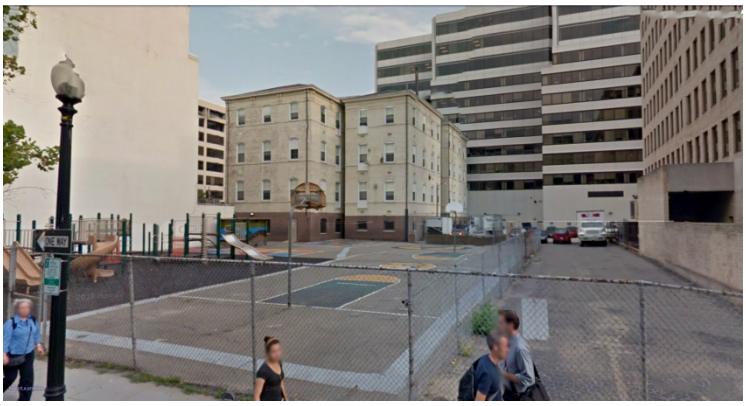

Figure 23: Thaddeus Stevens Elementary, north-facade, showing existing playground. Google Earth image.

The site proves valuable for this project because of its location and its existing historic structure. The location of the site is at the edge of the western edge of the K St. business district and is adjacent to the Foggy Bottom residential area. Furthermore, surrounding the site is the George Washington University.

Figure 24: Site figure-ground showing Thaddeus Stevens School in red and nearby Francis Stevens Campus and School Without Walls in blue.

Also of importance to this project is the schools proximity to two other unique schools. First, the Francis-Stevens Education campus is a large school campus that is filled with amenities and diverse student population. Currently, the school is schedule to be converted to a High school only campus which will require relocating the K-8 students. Second, is the School Without Walls. This school represents an existing

example of blurring the boundaries between school and work. The school is a program which uses work practicum as a major part of its curriculum for 11th and 12th grade students.

Finally, the site current development plan by the city offers a perfect opportunity to create an environment that blends a school and a work place into one place. Currently, the city has agreed to allow a developer to build a commercial office building on the playground lot if the school is renovated and returned to an educational purpose.

Figure 25: Site rooftop image with development area highlighted.
adapted from Google Earth image.

Figure 26: Site of Thaddeus Stevens School.

Thaddeus Stevens School

The existing school is a Registered Historic Landmark. The school was built in 1868[54] to educate that vast numbers of freed slaves that were moving into the Foggy Bottom. In 1873 additions were added to the school with some structural improvements. The existing Palladian façade was part of the renovations to the building. The building is composed of four levels with six classrooms on each level. The basement level is partially below grade due to a re-grading of the streets in the early 1900's. Part of the structures original purpose was for the front part of the then ground floor to be a town hall for the Foggy Bottom neighborhood.

In 2008 the school was closed due to the buildings condition. The DCPS Facilities Report states the structural condition of the building is good but the roof and systems are badly in need of replacement. Aside from that, the building has no ADA access, narrow doorways, and the building is not up to code for fire egress. All of these issues would need to be resolved before the building can be occupied.

The existing structure offers many opportunities for a rich learning environment. These include the historic construction type and materials, the historic nature of the building, and the design of the building as a perfect example of the traditional education model.

The adjacent lot served as a playground for the school. It is a paved lot with basketball courts and open play space. This lot as zoned as C-3 which allows for a

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[54] *DCPS Facilities Report for the Thaddeus Stevens School*

6.5FAR building with a height limit of 110’ to be built. Current proposals are for an average of 140,00SF office building with 2-3 levels of below grade parking. Most proposals use the loading docks and service areas for both buildings.

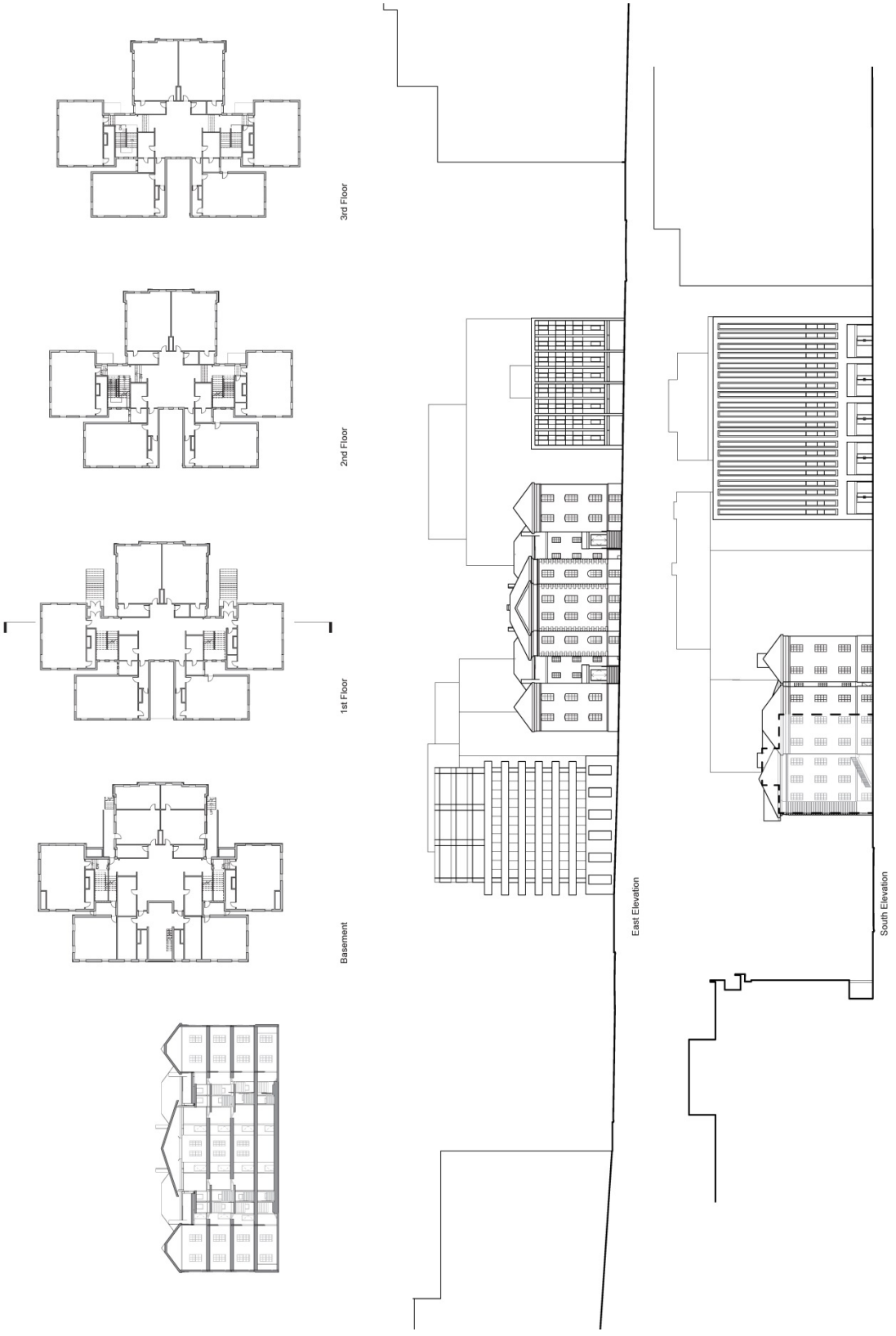

Figure 27: Thaddeus Stevens School, existing building section, plans, east elevation, and south elevation.

Figure 28: Foggy Bottom neighborhood with school highlighted. adapted from Google Earth image.

Chapter 6: Design

The final design combines the ideas of curiosity, wonder, creativity, and critical thinking into a dynamic and unusual environment. The existing structure is used as the primary entrance for the school component but most of its space is given over to shared spaces. The new building is divided into office and school communities with a shared space (the Street) connecting the two.

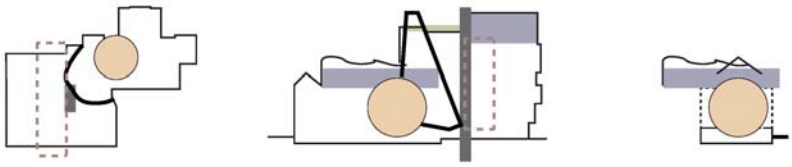

Figure 29: Street, Plaza, Town Hall, Playground, and Park.

Recognizing that space in the school and work communities would likely be designed much like those of contemporary school and work spaces, this project focused on the design of the spaces in between the connect them together. Most of the design work was to take advantage of the possibilities of the existing structure and establish a means for connecting to the new building.

Figure 30: Site plan of proposed design

Figure 31: Axonometric view of proposed building

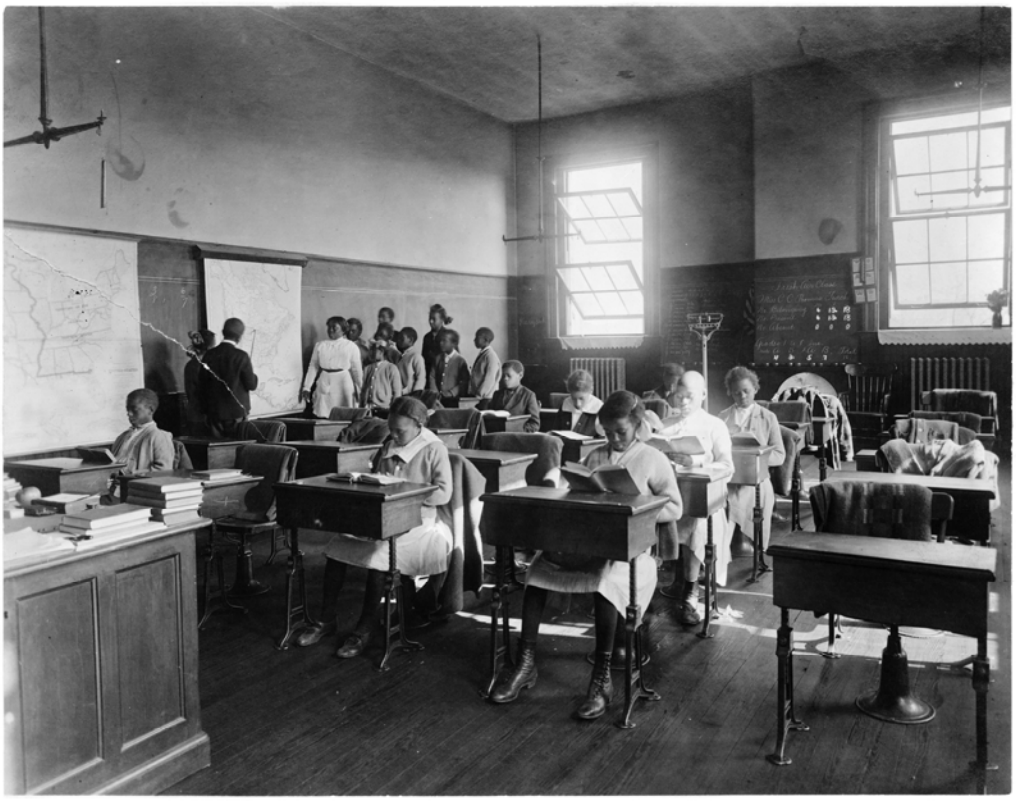

Figure 32: Historic photograph showing Thaddeus Stevens Elementary classroom. Source unknown.

Thaddeus Stevens School Intervention and the Town Hall

As previously discussed, the existing building has many issues that make it not at all ADA compliant. Furthermore, the two entry ways on either side of the building do not create a grand sense of arrival and entry. To repair both of these problems, the entry is moved to the expected center of the building. The entry then proceeds into the building at ground level which allows access to the elevator or to the grand staircase.

Figure 33: East view of redesigned entryway.

Figure 34: View of redesigned entry into the Thaddeus Stevens School

The Thaddeus Stevens building is a series of cellular boxes contained by thick, load-bearing masonry walls. The rest of the building is made up of circulation and service space. Seeing that the classrooms in this building are actually ideal classrooms—a 900SF room with 12’ ceiling heights and lots of daylight—the first instinct was to

keep them intact and use them for classrooms that might be shared by the school and work components.

This, however, diminished the enormous potential for this building to stimulate curiosity and wonder. The proposed intervention takes a radical approach to exposing the buildings structure and design. The walls and floors are cut to impose a spherical void in the building. This makes the brick and timber structure visible but displays them in an unexpected configuration. The purity and geometry of the sphere creates a counter-point to the very rigid series of boxes of the original structure.

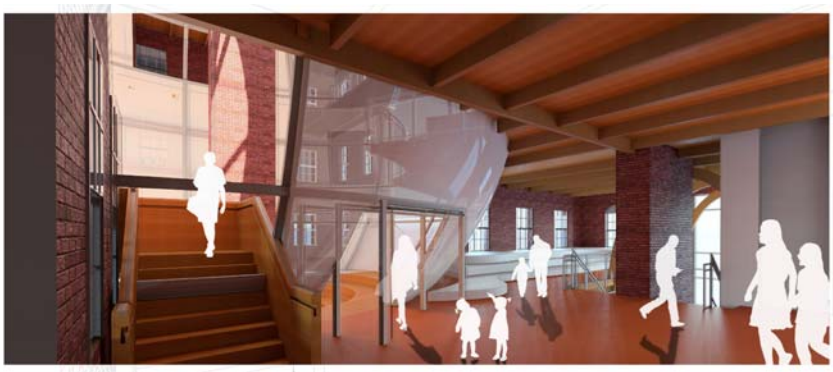

Figure 35: View of school lobby.

Inserted into the void is a spherical cage-like steel structure that mimics that latitude and longitude lines of the globe. The cage is tied into the masonry structure which it both bears on and supports. Using the left-over edges of the masonry walls for support allows the cage to act as structural support for the cut floor joists and roof framing.

Attached to the cage is a series translucent plastic panels. The panels provide an acoustic separation but act to create a surface that separated the inside of the sphere from the outside. On the outside, the sphere seems to be an object that has been thrust

into this seemingly impenetrable building. On the inside, the space is an open void made up of a thin steel frame and white ethereal skin that glows from daylight.

The sphere is pierced by a variety of openings. Some are small windows that allow occasional views into the space. Some are large openings that allow access to a series of balconies. The primary staircase is moved to the center of the building as an interpretation of the expected centralized grand stair. It is not, however, completely open, as it winds around and existing previously exterior wall and moves in and out of the sphere.

Figure 36: Town hall, view inside the spherical Town hall space.

The sphere is large enough so that it pierces through the existing roof and into the basement level. Below the sphere a cellar-like space is created in which the bottom of the seating area in the sphere forms the ceiling. There is an oculus in the center of the space that provides a connection to the space above. Dark, compressed, and below ground, this space embodies the mystery of the basement.

Figure 37: View into the Basement below the Town Hall.

The existing attic level is captured as an occupiable space by building a new roof plan above the level. Seeing that existing roof needed a complete replacement, it seemed fitting to take advantage of the wonderful timber framing in the roof and the possibility of being above and within the roof space. The sphere is again visible and engages the space by giving the opportunity to view the interior space of the sphere from above.

Figure 38: View into the Attic Playground.

Connection Between the Old and the New—The Plaza

To connect this two structures is was important to provide a clear sense of fluid space but to emphasize the difference between them. This is done by envisioning the atrium space as a plaza around which the disparate elements unfold. The Plaza acts as the main lobby for the elevator core, the spill out space from the cafeteria, and the threshold between the old and the new.

The edges of this boundary are defined by the exterior, now interior, walls of the existing structure, and an amorphous white surface that makes the edge of the new building. The space is animated by multiple circulation paths, circular stairs, the edge of the sphere protruding through the walls, and views into the spaces beyond the surface.

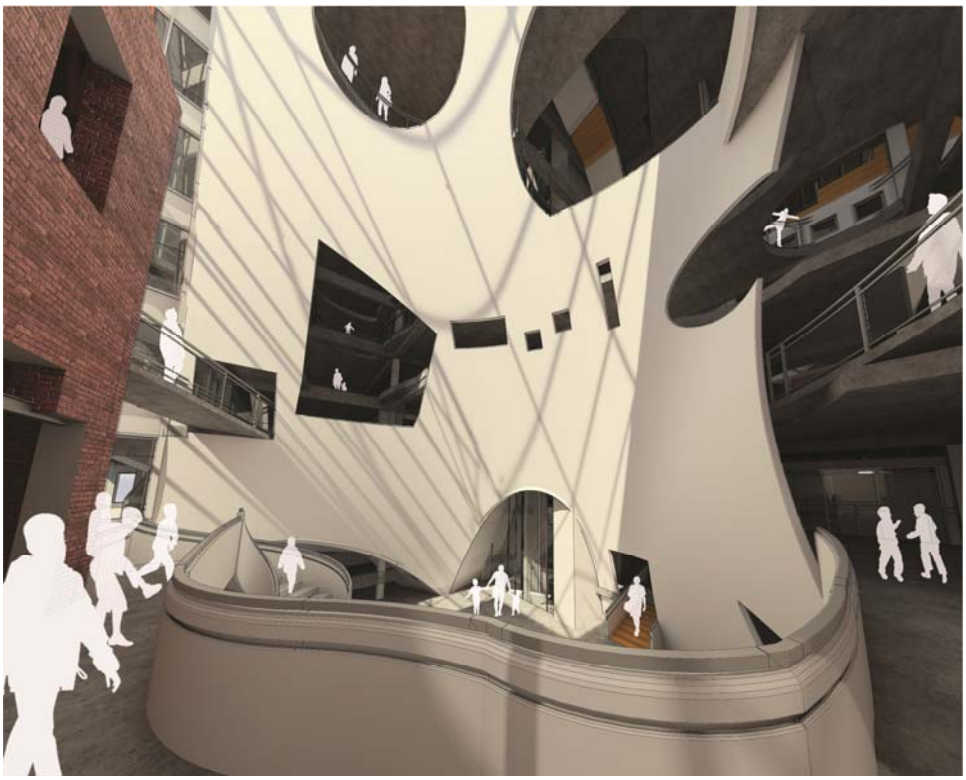

Figure 39: View of the Plaza showing the surface connection to the new building.

Figure 40: View of the Plaza showing the new and old buildings connecting together.

Figure 41: View of the existing structure with the proposed connection and sphere protruding through the walls.

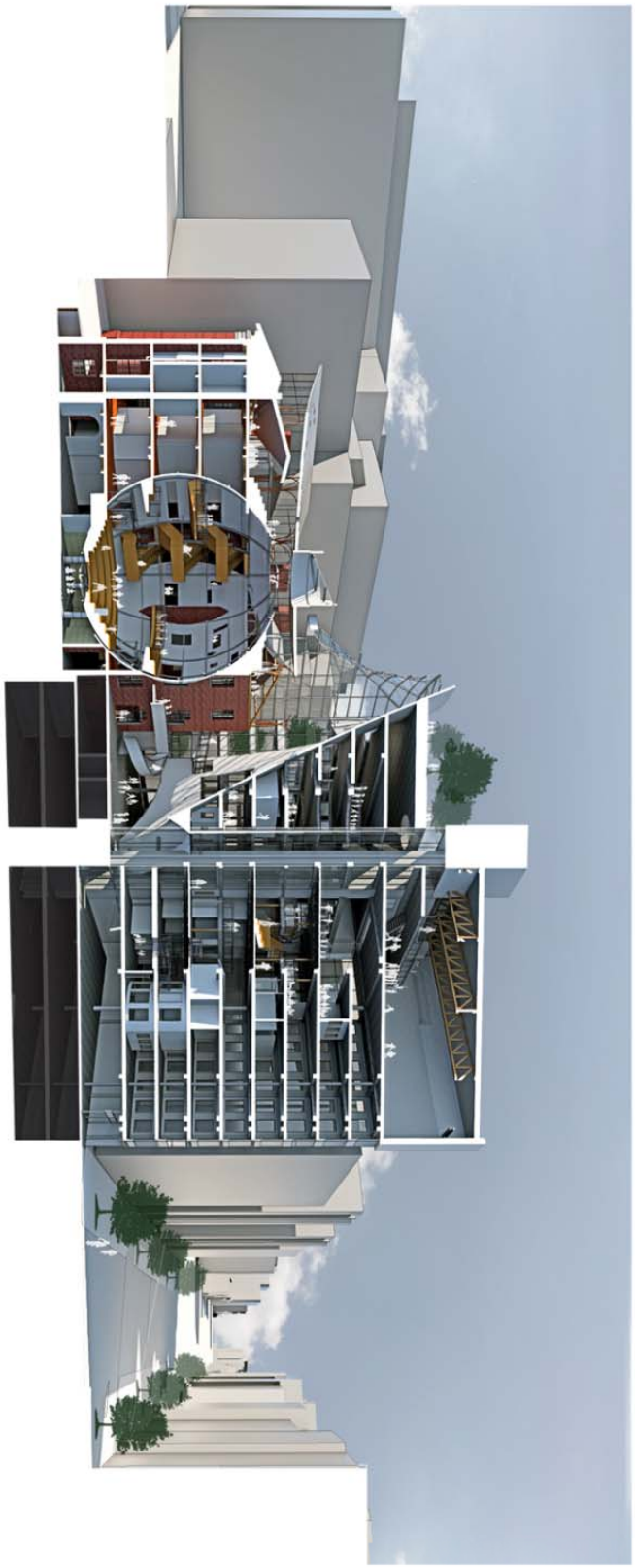

Figure 42: Section perspective cut diagonally through the Town Hall and Plaza spaces.

Figure 43: Plans showing program of spaces.

Figure 44: Section A and Section B of proposed

Chapter 7: Conclusion

The proposed learning environment represents a desire to disturb and provoke the common perception of such a place. The rather shocking intervention of the sphere into the historic structures may difficult for some to absorb but it stands as a critique about how to best expose the value and nature of such a historic structure. Furthermore, the reversal of the expectations of this space is intended to incite curiosity and wonder. I believe that such dramatic confrontation must be part of an assemblage of traditional, expected, and flexible spaces.

Such spaces as the Attic Playground and the Basement are ideas that take further advantage of the existing structure but do so by inverted the expected environment and further articulating their nature—e.g. relating to the sky and the dream-like nature of the attic, or relating to the ground and the contemplative mythos of the basement. The types of unique spaces create a sense that the function of the place is about much more than school or office work.

The drama of the surface in Plaza, made even more fantastic by the play of light cascading down from the large glazed wall, disturbs ideas of interior and exterior but it also serves as a boundary for the school and work communities above. The white, smooth surface acts a canvas to show off the views into the more active spaces beyond. When working to join differing populations, this type of connecting boundary becomes a critical piece of the architecture.

The third space within the argument is that of the Street. This space is the threshold between the school and work communities. It was intended to take on the form of a learning street the allowed for a common space around which shared group rooms would be located. This zone of the building was designed with a separate structural condition for the floors which enabled different floor heights and long-term adaptability.

The proposed connection between school and work may at first seem bizarre but when we consider the reality that these two are very much connected in our society, we may realize that it is actually quite strange that they are so isolated. Both have much to offer in the way being catalysts for change and pushing innovation. The questions and challenges of such a connection, however, are many. There are two main categories of problems that must be confronted: 1) separation vs. integration, and 2) the impact of the space on collaboration

Finding the proper oscillation between separation and integration is tricky and controversial. It is wrought with concerns about security. How do we keep the children safe and how we keep the work for being compromised? I take the position in this design that security must be more about openness and culture than about barriers and closed spaces. I believe that view and responsibility are better means by which to create a secure learning environment. I have, however, been accused of being utopian minded. But if we are to dream, shouldn't we first start with the impossible dream?

Integration is just as tricky. It is unlikely that we can expect both populations to suddenly work side by side without inhibition. It is equally unlikely to expect that all of their tasks will support collaboration. The architect's goal then must be to create opportunity and possibility for collaboration. Maybe, though, the architect must take the further step to create attractions that incite collaboration. These might be paths of circulation, views into spaces, designing that truly special spaces as part of the shared realm, and using shared amenities such as outdoor space. Hertzberger argues that in an open and flexible environment the architect's job is to provide a sense of structure and organization. I would evolve that to argue that architect's role is to create not only to create a structure for flexibility and adaptability is to design spaces that act as catalysts for creative use of the space.

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