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Architecture on Campus

An Interactive Qualifying Report

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By

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Kerry Doyle

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James Jenkins

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Professor Steve Taylor, Advisor

Abstract

The architecture of a college campus should exhibit both its form and function. Worcester Polytechnic Institute's architecture was evaluated in order to see if their mission is expressed in the Campus Center and Atwater Kent. By conducting interviews, performing visual analyses, and using portraiture in an unprecedented way, the group identified the essence of the two buildings. Conclusions were drawn about how WPI perceives its history and how the administration attempts to transform the school to reflect its changing motto.

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Introduction

What is Art?

What is art you might ask? One might say art is a message that is put into form and usually springs forth from emotion and expression. It is creative and holds a sense of originality.[i] Others however, might say something else. From the beginning of time people, historians, artists, and philosophers have debated and analyzed what art is. There seems to be no clear-cut definition due to the fact that sometimes what one considers art, another considers garbage. Some think anything that is grotesque or eccentric is not art. However, there is nothing that clearly defines art as necessarily being pure and beautiful. Since art is a form of expression it may not always be striking. Sometimes it is necessary for the artist to be gory or explicit and sometimes it is necessary for them to use odd techniques.

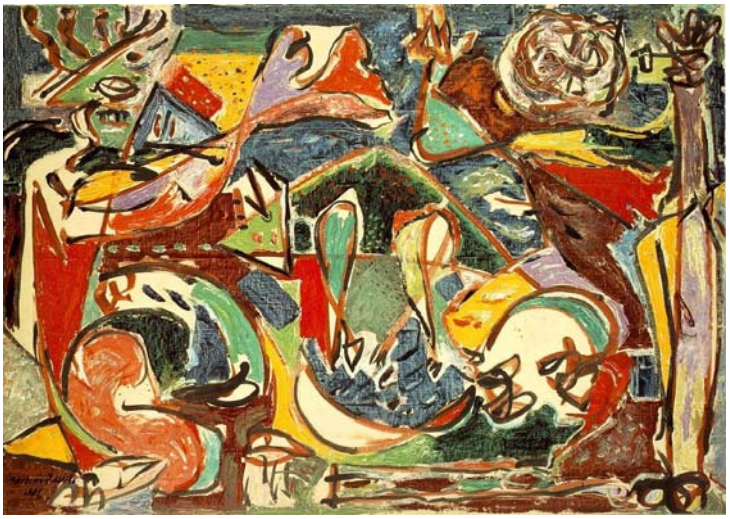

Figure 1 - Jackson Pollock's "The Key"[ii]

Through history for those trying to define art, there has always been a language barrier. Now that barrier exists more between our predecessors and us than between different cultures. Since concepts of what art is have been passed on from ancient times ideas tend to conflict with each other both with what art is, what it should be, and what parts should be valued most.[iii] In ancient Greece the closest word they had to compare with art was *techné,* commonly translated as technique. However, this seems too basic. Today we think of art as much more then this. While our definition for art is based on previous definitions that are incomplete, our modern day definition must intrinsically also me incomplete.[iv]

When the process and technique used to create art are analyzed we know that they are part of the communication of the artwork. It is this creation process that for many artists is the main focus of their work. Creation is the dimension of art that is particularly rewarding for the artist since it gives the artist a sense of belonging that nearly all human beings inherently desire to feel. When the artist has finished his project he feels as if he has contributed to society in some way.[v] The artist knows that his work has conveyed some type of message and will ultimately affect some people's lives in one way or another. He also knows that unlike any other material human creation, art has the ability to do this.[vi] Art has the ability to make people feel, think, and transform themselves. It surfaces emotions and desires.

Some of the basic connections people have with art are developed during infancy. After a child is born, their brain triples in size by the age of four. During this time "baby talk" instills in babies affection and familiarity to certain characteristics. A simple series of phrases like: "Mommy loves you. Yes. Yes. Did you know Mommy loves you? Yes

she does. She does. She loves you." can begin to make a child comfortable with a technique known as repetition or rhythm.[vii] A child will recognize a certain tone in a mother's voice and through it sense emotions such as love, anger, fear, etc. Facial expressions are also noticed and a child will attempt to duplicate them in a technique known as imitation. Children's games such as "This Little Piggy" or "Eentsy-Weentsy Spider" prepare an infant for a climax.[viii] It is these basic techniques that are taught to us while we are young that artists use to convey what it is they want.

Since art has the ability to alter people it is said to be both pleasurable and therapeutic. It is also thought of as a teaching aide because it exercises and trains our perception of reality. It prepares us for the unfamiliar or provides a reservoir from which to draw appropriate responses to experience the unknowing. Some believe that art satisfies a psychological need but there are many people that seem quite able to live without the more refined arts. It is pre-industrial societies that do not have a concept of art because for most of them it does not exist. However, these people still engage in and enjoy singing, dancing, carving, decorating, and other things we generally refer to as art.[ix] Even in our society today we have a much different view then our ancestors of what art is. We break art down into different categories with each category having its own characteristics. Painting, sculpture, architecture, as well as many others are forms people commonly recognize as art. Yet the ways in which they are accomplished are different for each. Something as simple as a brush stroke can make a world of difference in painting. Whether they are fine, light, hard, or thick people interpret each stroke, each mark differently. You can blotch or swirl and each will have a different effect on its viewer. Materials include both the medium and media, or surface to be painted and the

paint. These materials have different characteristics and the sensation people get from viewing paintings is partly reliant on them. Color schemes are used to make people identify with others or focus on certain objects. In modern art, shapes as well as colors are often used. They encourage people to "think outside the box" instead of simply viewing what is considered the norm.

In sculpture materials are more of a focus then they are in paintings. You want your viewer to see every detail and because of this you need a material that will allow for this. In ancient times bronze was the material of choice. This was because casting was the way of the world and Egyptians would cast people then fit bronze armor to them. Presently, wax is the material of choice. It can be easily manipulated and colored to form lifelike figures that can be seen at wax museums throughout the world.

Art is a form which is brought to creation first through concept and then through application. Talent, however, is what determines the quality of the art. Some people will be great at producing art while others will not be so fortunate. The driving force behind producing art, while lacking talent, can be attributed to human nature. People desire to produce art because other people can relate to the messages found within it and because it has the ability, unlike all other human creations, to alter people. Whether it is formed from single carves or brush strokes, it all evolves from a single concept driven by human nature.

Literature Review

What is Architecture?

Architecture is an art yet somehow it is different then other forms. Although architecture has an aesthetic purpose, it also holds a physical purpose and therefore its understanding tends to vary from architect to architect. The problem with the concept of architecture is that its fundamental concept is to provide protection and shelter for human beings. However, when we look at buildings and apply this concept we see that there are parts which would then be considered superfluous. Therefore, its purpose is contradictory to any type of ornamentation. Yet we know many would say that without ornamentation it just is not architecture. The true question then is should decoration be synonymous with function when it comes to the concept of architecture? Some architects like the renowned Adolf Loos believe that if it makes you feel something then it is architecture. Now if its purpose were strictly to provide shelter then it could be as simple as a box and evoke just that much feeling. However with ornamentation and a sense of style, an evocation of emotion can then be felt. Adolf Loos describes architecture as, "A mound in the woods, six feet long and three feet wide, heaped up with a spade into a pyramid, then we become serious and something inside us says: here someone lies buried. *That is architecture.*"[x]

In the book *The Theory of Architecture*, by Paul-Alan Johnson, architecture is defined as the combination of congruence and confluence. Congruence is a continuous state of being at rest, while confluence is a momentary state in a moving setting. Together they define architecture.[xi] It is the still building and how it interacts with the people around it that make it architecture. This suggests something else though. That

architecture has both an essence and a nature; its essence meaning its being or what it is. Often, people refer to its essence as its soul, suggesting that it is alive. Nature also suggests this. It gives you the idea of birth and the ability to fulfill its potential.[xii] If this is true then we can clearly see how a building can have a large effect on those that view or enter it. The way we interact with the building can evoke calmness, tension, joy, and even stimulate the mind.

The Look of Architecture, a novel by Witold Rybczynski, discusses the author's idea as to what he thinks architecture truly is. An avid writer about the subject, Rybczynski mentions that his favorite description of what architecture is is by Sir Henry Wotton. Written in 1642, he stated: "In Architecture, as in all Operative Arts, the end must direct the Operation," and that "The end is to build well. Well-building has three conditions: Commoditie, Firmeness [sic], and Delight."[xiii] Wotton's ideas were based upon those of Vitruvius, a Roman architect, who stressed function, beauty, and the ability of the building to withstand Mother Nature.[xiv] Vitruvius had a logical explanation; in order for the art to be considered architecture, it needed to be able to withstand all that could tear it down, or else it would not be a structure, but a mass. Yet its definition also includes that beauty must be present. Most people would agree that not every building is beautiful. Therefore, Vitruvius must have meant something more. Perhaps what he really meant was that in order for a building to be considered *Architecture*, there needed to be something alluring about it.

Yet another person with a fascinating view on what entitles a building to be considered a piece of architecture is the famed architect Louis Kahn. When the question, *Why Architecture?* was asked to him, his response to the question was:

> "I think that if you were to define it, you would destroy it. In a Hebraic way of attacking your logical problem, I ask you one question. Maybe you can answer it. I would say that if you ask your question as, "Why anything?" maybe the answer is in that."[xv]

Kahn believed that the answer to this question was *'Because it is.'* He believed that by answering the question you would only undermine architectures true identity and value of it. Although Kahn would not define architecture he explored it socially, aesthetically, economically, and spiritually because he saw it as "an expression of the human place in the world."[xvi]

We have many ideas as to what people believe architecture to be. In an effort to identify what something is, it is often a good idea to examine what it was in the past. History repeats itself with architecture as it does with many other things. There is a learning process involved in the history of architecture. This comes from examining what was done correctly and incorrectly and also by learning how it has evolved.

A look at the Past

During the first period of architecture, known as Prehistoric Architecture, designers did not need to worry about hiding the structure. The building was the structure and there was nothing more to it then that. This period included stone circles, megaliths, as well as other structures. The most famous example of this period is found in England at Stonehenge. The designers are considered to be the period's most skilled architects. Designed around 3,100 B.C. and rebuilt around 2,100 B.C., Stonehenge was built 2,000 years before the Great Britain was ever founded. Stonehenge was a ritual center and an enormous time dial.[xvii] It is still unknown how people were able to get the giant 45-ton stones to stand upright.

The next period of architecture is known as Ancient Architecture. This period ranges from 3,000 B.C. to 337 A.D. During this period the Egyptians, Greeks, and Romans all built extraordinary structures, some of which still stand today. Throughout the prehistoric period Egyptians built pyramids and constructed them with massive stones and bricks.[xviii] The process of building a pyramid took thousands of workers and an immense amount of money, which was why kings were the only ones who could afford such structures. In the process known as a ritual, kings were buried along with their riches inside their castle. At the same time, Greeks and Romans, were building many coliseums and arenas that reflected the culture of their society. Columns were used as visible support structures and festooned so they would be extremely beautiful. Marble was the material of choice and when it was not used, a dust made from it was used as a coating to smooth and beautify the pieces.[xix]

The next period consisted of Medieval Architecture, which ranged from 373 to 500 A.D. During this time hundreds of churches were built. European architecture moved from rectangular basilica forms to classically inspired Byzantine. At this time because the church was so wealthy, they were the only ones who could afford to build such fashionable structures. While many of these buildings vary in design within commonality is a large central dome. Generally the dome was flanked and partly sustained by smaller and half-domes spanning peripheral spaces.[xx] This central location was used for gathering and was decorated more then any other area of the structure.

From 500 to 200 A.D. the Roman Empire spread throughout Europe conquering everything in its path. This period is known as the Romanesque period and incorporates many ideas from the ancient Greeks and Romans as well as components of Byzantine and

Eastern origin. Two major features from this period were the crowned towers or twin towers and vaults.[xxi] The towers were created through trial and error, whereas the vaults originated from the idea of Christian basilicas.

Gothic Architecture, which lasted from 1200 to 1400 A.D., also used several aspects from previous periods. Techniques like ribbed vaulting and the pointed arch were borrowed from Romanesque architecture, but never before had they received such a purposeful and consistent application. While the Romanesque period stressed heavy masses and delimited areas, Gothic construction is characterized by its lightness and soaring masses. Flying buttresses made possible the reduction of wall surfaces by relieving them of part of their structural function.[xxii] This enabled great windows to be set into walls allowing rooms to be lit by stained glass. Twin towers dominated gothic architecture, similar to how they dominated Romanesque architecture.

Renaissance architecture (1400-1600 A.D.) was an age of "awakening" for both the French and the Italians. Inspired by classical principles, architects of this period built many country villas for the period's wealthy nobility. These high timbered houses had very narrow alleyways between them.[xxiii] One idea from this period was that a building would be more attractive if it had works of art inside it. This is evident in the fact that during the Italian Renaissance, the Sistine Chapel's ceiling was painted by Michelangelo. This is a masterpiece that even today attracts people worldwide.

From 1600 to 1700 A.D., Baroque architecture dominated most of Europe. Continuing the idea of interior decoration, Baroque architects would decorate the entire interior right down to the floor. Buildings of the period are composed of great curving forms with facades, ground plans of unprecedented size and complexity, and domes of

various shapes.[xxiv] Many works from this period were modeled after smaller buildings but the duplicate was always much larger in scale.

The Victorian period saw a revival in almost all previous types of architecture. Victorian Gothic featured high gothic buildings with arches and pointed windows. Though named after Queen Victoria (1837-1901), her husband Prince Albert was a big promoter of the style. He had it featured in nearly all churches, universities, and public building in England during this time.[xxv] Victorian Romanesque and Byzantine found new uses for materials like iron and glass. The use however was for structural reasons and the materials were often hidden from view.

By the 1900's architects took architecture to a whole new level. Buildings began to be designed with asymmetrical shapes, arches, and decorative surfaces with curved, plant-like design. Zigzag patterns and vertical lines created a dramatic effect.[xxvi] Modernism, what the period later became known as, emphasized function. It attempted to provide for specific needs rather than imitate nature. Formalism emphasized highly structured visual relationships rather than subject matter, symbolism, theme or ornamentation.[xxvii] Postmodernism evolved from the modernists, but many of their ideas contradicted the theories from which they evolved. Buildings used familiar shapes and details in unexpected ways making a statement and even delighting the viewer.[xxviii]

In the most modern buildings one common idea is that chaos invokes thought. The controversial Frank Gehry is leading the way in this believe. Gehry likes to create a conflict and collision between the new and the old. His house, built in 1979, tries to maintain a "freshness". You can see many of these same ideas in a number of his more modern buildings that will later be discussed in further detail. The "freshness" he tries to

achieve, is often lost in over-working details and in over-finishing them. He believes that in avoiding a finished look, you avoid predictability.[xxix] At the same time, some believe complexity can come from simplicity. Charles Jencks has said "If modern architecture tended toward a distilled simplicity where many requirements were purified towards simple, regular shapes, then Late-Modernism, keeping this overall simplicity allows it to become irregular and complex. The mixture 'complex simplicity' is itself a form of oxymoron…Complex simplicity is a series of 'yes, but' statements".[xxx] While there are intrinsic architectural needs that must be addressed and kept simple, a building can really inspire the imagination by creating a complex simplicity.

All changes in architecture throughout the course of history were either a result in resources or functionality. People could not build with materials they did not have, and if a material they had been using suddenly became less available a change needed to be made.

We have learned that the function of a building is not only to shelter us but also to instill a certain feeling among the people that interact with it. A building can create this feeling with its life-like essence. As architects have become more knowledgeable about what people need and how a building can accommodate those needs the quality of architecture has improved. However, people are constantly changing and buildings need to change along with them in order to continue to serve its purpose.

Architecture, although a true art, is still remarkably different then both sculpture, painting, and most other art forms. Its size is overpowering and the complexity of its body is incomprehensible to most people. Yet through this, its function remains something that is very basic, a form which people know they need, shelter. It is because

of this that people are in awe of architecture. They need it, yet do not quite understand how it works. Its space has the ability to alter people's moods and people them into a certain mode. For example, when one goes to the library, he often goes to read or research, however if he feels uncomfortable in the space because there is poor lighting or it is too noisy then he wont want to do his activity there. When one goes to the library and becomes engrossed in what he or she is doing then we can say the library was designed well for its intended use. This same reasoning can be applied to college campus architecture.

Role of a University

While we now have a better understanding of what architecture is and how it has evolved, before examining the role it plays at a college institution, we must first understand the role college plays to a student. The University although intended to educate about a specific topic has become much more then that.

> "We consider the University as a tool and as a place. Many of its functions and uses are known and many are not. We take as a working hypothesis that the principal function of the university is to encourage exchange and intellectual regeneration between people in different disciplines, so as to enlarge the field of human knowledge and increase man's control over his collective and individual activities."[xxxi]

This defines an institution as being a place where knowledge is shared and where people learn about humanity. However, this definition fails to mention that its role can also help a student find out who they are and what they want out of life. Ultimately a university creates a more independent person who is more knowledgeable about themselves, humanity, and society. While being at a university a student must learn to be proactive and introspective so they can find their place in society. The role of the building,

therefore, is to encourage a place of study and to urge the student to pursue his quest for knowledge. If the college and its campus cannot accommodate the student then either the student will ignore his studies and indulge in nonproductive activities or will be encouraged to transfer elsewhere. Educating oneself is also about maturing, socializing, and becoming a better person. Buildings too, should allow for these things. If a school does not encourage socializing through its structure then how could one learn to interact better with others, it would only put a damper on the growth of the students.

The architecture of a university is important to its establishment for three main reasons. For starters it creates an identity that the school is known for by its faculty, alumni, visitors, and current and future students. If the school is physically beautiful and kept up, then it should attract students to the school because it has left a memorable impression. Secondly, it supports the mission of the school. It is there to be a visual reflection of what the college stands for and aims to establish in its students. And thirdly, it helps sustain or improve the standing of the university against its peers.[xxxii]

Most universities have their own architectural quality which is rooted in the original buildings and use of certain materials and details. This "style" evolves over the years due to new codes, building technology, and programs. However, maintaining continuity while accepting new technology can cause a problem when new buildings are established. This poses quite the challenge for the architect. It then becomes his goal to join innovation with tradition. This challenge has led to attempts at developing guidelines for college campuses. The guidelines place emphasis on the building responding to the school's program, its site and context, and its heritage.[xxxiii] "The resultant designs will reflect a campus's commitment to its traditions and its relationship

to surrounding development."[xxxiv] This means simply, that the goal of campus architecture is to have a physical representation which shows what the schools is about.

Role Architecture Plays on a Campus

Colleges around the country are currently shaping the bright young minds of the future. It is here on these campuses where future leaders, doctors, lawyers, and engineers are preparing for life. Without the correct atmosphere colleges would not be propagating the right the type of mind needed for the job. This makes the atmosphere of the campus vital to the destiny of the student. If a student can not learn and grow then what good is the college experience? Colleges are supposed to foster growth and a college's architecture is vital to this process. It is for this reason that understanding the role architecture plays on a campus is important. It makes a very important statement about the school and the type of student it produces. For a college to know how its architecture affects people is imperative to its establishment. The Board of Trustees and President of a School should be diligent in making sure that the school is not falling behind standards. If prospective students saw a campus that was lacking, and chose not to attend, this would ultimately decrease enrollment. Without students, there would be no alumni or professors, and if this were to happen the school would have no accolade and virtually no income.

Examples of Architecture on Campus

Volen National Center for Complex Systems at Brandeis University

Conscious or not of architecture, it will influence a potential students final decision about whether or not to attend a school. A student need not be an architectural

connoisseur to have an opinion on the architecture. It's form, style, layout, distance between buildings, materials, use of windows, doors, and walkways all suggest a certain message about the school. Let us not forget about interior architecture, for this too plays an important role. First, there are the locations of stairwells and elevators, quality and types of lighting, color schemes, number and accessibility of study lounges, and classroom set-ups. The type of school and its philosophy on how material should be taught play a key role in the classroom set-up. For example, the Volen National Center for Complex Systems at Brandeis University houses the computer science, cognitive science, neuroscience, structural biology, and artificial intelligence departments. Combining programs allows the University to allow its students to work on complex research projects. Because Brandeis is a school that bases its fundamentals on research and there is a strong interaction between students, faculty, and graduate students the offices for faculty and student organizations are designed to allow interaction. The architect designed the building with the positioning similar departments next to each other.[xxxv] This design approach only further reinforces Brandeis' philosophies on student- faculty research projects and developments.

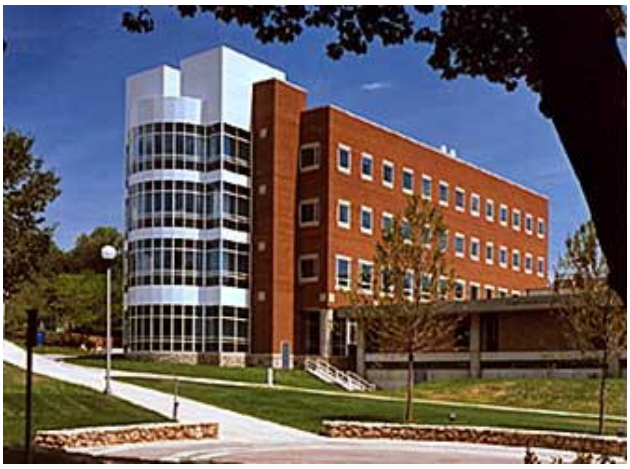

Figure 2 - Volen National Center for Complex Systems at Brandeis University[xxxvi]

Business School and Mass Communications Center at Quinnipiac College

The Business School and Mass Communications Center at Quinnipiac College is also designed by the architect to reinforce the colleges' values. Being a communications and business center, it was necessary for the architect to include televisions that would allow students to view what was going on in the news and world market reports. Center Brook Architects and Planners placed these on the columns holding up the glass dome. Extended from either direction of the dome are corridors for each department. To encourage conversation and studying, numerous lounges were placed along the business corridor. The mass-communications corridor consists of three case-study classrooms in which the traditional lecture style room is not used. Instead seating in the round is used to create the opportunity for discussions similar to those that would take place in real life business situations. This hallway also contains a radio studio – viewable through a large window, a control room, and television studio. All of these things they make viewable to the public which allows interested high schoolers to see what Quinnipiac has to offer, yet simultaneously it allows the college student to be in front of the public doing what they will one day be doing.[xxxvii]

Stata Center at MIT

Campus buildings can also send messages about themselves and the aura inside the building. One such example would be the 283.5 million dollar Stata Building at Massachusetts Institute of Technology. This 66,000-square-meter building houses the Computer Science and Artificial Intelligence Lab, the Laboratory for Information and Decision Systems, and the Department of Linguistics and Philosophy. The site's former

structure, Building 20, was originally a temporary facility for military research back in the 1940's. Although it belonged to one of the wealthiest colleges in the nation, this building was actually tremendously run down. This aspect of Building 20 was one of the things that essentially encouraged innovation and invention, such as the developed atomic clocks, solar vehicles, and underwater cameras. It was this low quality of the building that allowed students and researchers to do as they pleased. Therefore, when architect Frank Gehry came up with a project proposal, his building reflected what had become a driving force behind some of the inventions – creativity and a sense of exploration.

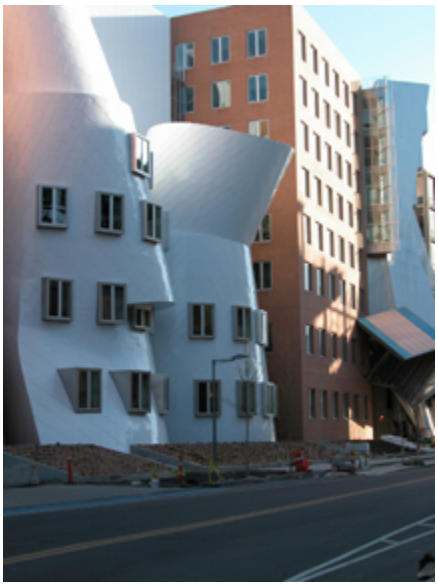

Figure 3 - State Center at MIT[xxxviii]

The design portrayed what MIT was concerned with but ultimately the Stata Center reflected what occurred within it because it resembled no other building on campus. To come up with his unique plan, Gehry started out like most architects designing what he had in mind for the site. Instead of finishing the plan though, he left his plans unfinished until he had had a chance to talk with MIT researchers as to their needs and how they worked together. What he found out was that they valued communal

labs and lounges and private offices.[xxxix] What the building looks like is actually quite difficult to explain and what one person sees another may not. Rodney Brooks, a journalist for the *Technology Review* had this to say about it in the September 2004 issue: "It looks like a large-scale sculpture, in which leaning towers are fused with elements that resemble brick warehouse buildings, a bright yellow kiva, crushed soda cans, and a blindingly silver beached whale with a smokestack in its center."[xl] From that description a picture of a curvaceous, jagged floored, jutting windowed, and "out of the box" building probably comes to mind. While the outside is remarkable, the inside is even more outrageous.

The Stata Center is on a raised floor allowing for the heating and cooling system, communication infrastructure, and power cables to be located in that space. This allows for change within the building, as electrical equipment can be moved anywhere with all the outlets. No technological university would be complete without using some type of environmentally friendly system and the Stata Center certainly is no exception. Here too, it makes use of the raised floor. Beneath lies a state-of –the-art ventilation system which pumps in unchilled fresh air. This building also employs a gray-water system that stores and distributes collected rainwater to such things as toilets.[xli] John Guttag, head of the Electrical Engineering and Computer Science department at MIT, believes this building proclaims that the school is full of "bold and confident risk takers and that MIT is willing to work hard to achieve greatness."[xlii] However, many people seem to wonder whether or not the Stata Center was a practical use of MIT's money especially considering that the building came at a time when its endowment is only getting smaller.[xliii]

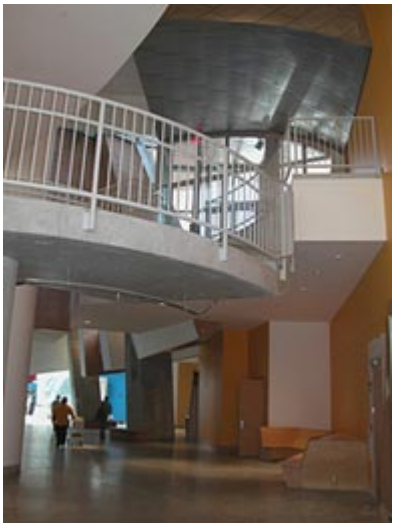

Figure 4 - Interior of Stata Center[xliv]

College Architecture

Throughout the ages resources and money have been limiting factors for architecture. You cannot build much more then a mud hut if all you have is mud and sticks. Historically the cultures with money and power have created the beautiful architecture. Philip Johnson, a well-known architect, has designed buildings such as AT&T headquarters, Kline Science Center at Yale University, and his famed "Glass House" which he won the Pritzker Prize Laureate for in 1979.[xlv] In the book *In Games*, he talks about money in architecture:

> "We are whores and want to be paid as highly as possible for doing what we do best. Therefore we do skyscrapers best – they're the most profitable."

> "I'm very commercial myself and I find [commercial clients] just as intelligent…The commercial people in this world – the really rich, the really successful and managerial types – have a justifiable sense of pride in their work, and majesty is what they need to celebrate it. But I would do it for Lenin too. I don't care."

Although architecture is an expensive form of art it is not just hiring the architect that is responsible for this. Materials also make up a great cost. Whether it is steel, wood, gold, or cement, the more materials used on a building the more expensive it is to build. Two things an architect must keep in mind when choosing a building's material is its ability and its beauty. Along the same lines an architect decides what is to be seen or remain unseen. If a steel rod is not seen by anyone that views the building its only purpose is to support the structure. Therefore its beauty doesn't have to be taken into consideration. On the other hand, something like an interior wall or doorway is constantly being viewed by different people and therefore needs to demonstrate the architect's intent.

When a college prepares to construct a new building on their campus there are many things they must consider when estimating the cost of the project. Not only must an architect be hired, but in addition, a contractor, cost estimator, structural engineer, mechanical engineer, and electrical engineer must also be hired. Sometimes, depending on the extensiveness of the project, a geotechnical engineer must also be employed to assess and make recommendations for the site. If a University chooses to do so, and it is in their budget, lighting design consultants, landscape consultants, and acoustical consultants might also be hired. It is actually quite astounding to think of the entire cost of construction once materials are also taken into account. Therefore, when a university hires an accomplished architect you know the costs are going to be considerable.

College Architecture in America, a novel written in 1929 by Charles Klauder and Herbert Wise, had this to say about the role architecture has played in American history: "There is no art in which this country has made more rapid strides than architecture, and our institutions of learning should embody this national progress, especially, since it so

effectively ministers to all other arts as well as to science and to daily life."[xlvi] Though this book was written in 1929, this statement seems to be even truer then it was seventy-five years ago. The Stata Center at MIT seems to push the boundaries in a way that no other building has up until this point. The Stata Center is extraordinary however; it is not the only building to try to push the boundaries of architecture.

Center for Biotechnology and Interdisciplinary Studies at RPI

Another building that will have a huge impact on the future of its school is the Center for Biotechnology and Interdisciplinary Studies at Rensselaer Polytechnic Institute.

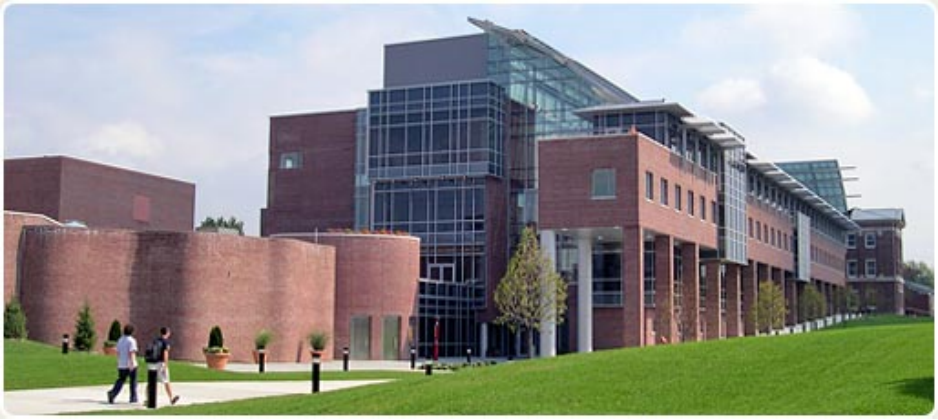

Figure 5 - Center for Biotechnology and Interdisciplinary Studies at RPI[xlvii]

The 218,000-square-foot building which cost an estimated 80 million dollars is being designed by an alumni and board chairman of Burt Hill Kosar Rittelmann Associates. Mr. Richard Rittelmann belongs to a firm that in 2002 was ranked 187th by *Engineering News-Record* in its list of the Top 500 Design Firms. It is Rittelmanns belief and philosophy, one he has stressed to all the companies employees, that "Nothing is quite so

embarrassing as an elegant solution to the wrong problem." It is this philosophy that has allowed him to create a building that is specific to RPI's and other client's needs. Belonging to a very scientific school, the center has many resourceful systems including an energy efficient lighting system and a heat-recovery system that allows for six air changes an hour and traps air from labs as the air is being exhausted.[xlviii] In addition the glass-atrium above the corridor of the L-shaped building will require minimal heating units and natural ventilation will be used. The remarkable thing about the design of this building is that is extremely inviting to the researcher and to the visitor. Rittelmann claimed that research buildings have a specific connotation about them, which often times has a tendency to intimidate. He had this to say about his design however; "The main purpose of the atrium is communication and interaction by the researchers in the building and anyone just passing through."[xlix] The connection it provides to the other end of the campus coupled with its protection from the severe weather is what draws people to this building. Perhaps having been a student there at one point is what allowed Rittelmann to design a building that was so in tune with what the students needed whatever the case, his design provides efficiency and function, something that all college students know only makes life easier.

Crown Hall at Illinois Institute of Technology

The Illinois Institute of Technology was yet another campus that during its time of establishment pushed the envelope of campus architecture. There were many things unique about this: one was that it was designed as an entire campus and two was that the renowned architect Mies van der Rohe designed it. The creation of the IIT campus was the first campus that was composed entirely of modern buildings. The campus stretched

across eight city blocks and was arranged asymmetrically creating a distinctive internal space that never closed off any of the buildings. Another remarkable thing about IIT's campus is that Mies designed the campus keeping in mind that as technology progressed buildings would need to transform. It is because of this, that most of the buildings are very industrial and indistinguishable from the outside. The building that probably most fulfilled this idea of "changing demands" was Crown Hall.

Figure 6 - Crown Hall at IIT[l]

Home to the school of architecture and institute of design, the building was perfectly square while its roof suspended from four girders located at the corners of the building. This design allowed for no internal supports and created what he thought to be "the ideal work of architecture."[li]

Developing Campuses

In 1987, the United Nations Commission on Environment and Development, defined sustainability as: "development that meets the needs of the present without compromising the ability of future generations to meet their needs."[lii] As a result of

technological advancements and the impact the humans are placing on the environment sustainability is the something architects are now trying to include in today's college campuses. It is starting to be applied to such campus factors as open space, transportation, resources conservation, housing, air and water quality, and building design. The term must incorporate, on a grander scheme of things, the balance of community, economy, and environment. To be considered a "high performance" or "energy efficient" building requires an integrated development process. This process combines design, construction, and maintenance practices, which considers their environmental, economical, and societal impacts.[liii]

In order to convey the message of having an organized campus three rudimentary infrastructure systems must intertwine well together. These include wayfinding systems, or signs, lighting, and site furnishings. Wayfinding is the ability of campus users to see evidently the organization of the campus without signs. Signs should only be used when it comes to such details as visitor parking and directing visitors towards established visual cues. It has been shown that too many signs only confuse the visitor and therefore campus signs should be limited. Lighting is something that has a tendency to be overlooked at some college campuses. However, it is important to both the safety and wayfinding of the environment. Sporting events, library visits, and some lectures generally occur in the evening and without the proper lighting system, students well being may be put into jeopardy. Site furnishings range from trash cans to benches and news racks. Furnishings should be placed carefully; they should be comfortable and aesthetically pleasing to the eye.[liv]

Campus architecture across the nation varies. Factors affecting this are how much money the school has access to, either through tuition, grants, or alumni, and the function of the school. To determine the function of a school's establishment one must read the college's mission statement. Of course how closely a school follows its mission statement is a good indicator of its true function. Now that we have seen examples of college architecture and how those buildings have followed their intended function we must look at WPI's mission statement to understand what the goal of WPI is. Once this is done we can address the question of whether or not the campus suits the needs of the community.

Function of WPI

The function of Worcester Polytechnic Institute must be known to access whether or not its form meets its function. WPI's mission statement claims:

> "WPI educates talented men and women in engineering, science, management, and humanities in preparation for careers of professional practice, civic contribution, and leadership, facilitated by active lifelong learning. This educational process is true to the founders' directive to create, to discover, and to convey knowledge at the frontiers of academic inquiry for the betterment of society. Knowledge is created and discovered in the scholarly activities of faculty and students ranging across educational methodology, professional practice, and basic research. Knowledge is conveyed through scholarly publication and instruction."[lv]

A fundamental part of WPI is its unique projects program. The three projects are the Sufficiency, Interdisciplinary Qualifying Project, and Major Qualifying Project. They include working in groups to execute a question, hypothesize about it, research it, and conclude about it through a research paper. From this we can clearly see that WPI promotes hands-on-learning, group work, and project learning. We know what comprises

a campus and we have looked at how various schools have addressed their needs through campus architecture. Now it is time to look at our school and see whether or not our needs are being met. Is WPI a place where undergraduates feel they have the correct setting to complete their group projects? Is WPI a campus that allows for visitors to find their way without becoming confused or lost? Does WPI address the needs of faculty allowing for them to teach in the manner by which WPI bases its curriculum? There are many questions regarding the WPI campus that our paper will take a closer look into. They will ultimately answer the question regarding WPI's architecture and its affect on the school.

Methodology

Introduction

To assess how Worcester Polytechnic Institute's campus architecture affects the school we decided to select two buildings and analyze them each based on their purpose and style. Looking at two buildings allows us to spend adequate time on each while simultaneously allowing us to arrive at a more accurate conclusion. Analyzing more then two buildings might give us too much work to do with not enough time to do it in and analyzing only one building would not be sufficient because if the building was the exception, then we would not get a true answer. Once the initial analysis is completed a series of interviews will be set up with people we feel are qualified to answer questions about each of the two buildings. The interviews will serve as insight into the Campus Center and Atwater Kent, seeing as there is no material written about either of the two buildings. Proceeding, we will use a method known as Portraiture to identify the essence of each building in hopes of finding out the nature of WPI's architecture.

Sampling: Atwater Kent and the Campus Center

The two buildings we chose to evaluate at WPI are Atwater Kent and the Campus Center. We chose to do these two buildings due to their extreme differences in style, function, and time period built. The campus center is the newest building to date and Atwater Kent was built at the beginning of the 20th century. Since technology has changed drastically since then, products such as lighting and furniture, along with other various materials make the differences between these two buildings immediately noticeable. The differences between the buildings are what make them good choices to

assess WPI's architecture however; the research of both buildings will be difficult due to the lack of information about them on account of their age.

The intended functionality of the Campus Center, based on its mission statement, is to act as a community center for students, faculty, administration, alumni, and guests. It supports and promotes student involvement in co-curricular activities. The campus center houses a dining facility, a café, mail services, the university bookstore, a game room, social lounges, meeting and event spaces, email terminals, an atm, and an information kiosk. In addition, it also holds many offices including, the Student Life Office, Diversity and Woman's Programs, Minority Affairs, and the Events Office. This building affects so many people and in so many different ways both of which make it a great choice to study.

Atwater Kent's architecture is much different then the Campus Center's. It is not as multifunctional nor is it as widely used by so many students and faculty. The purpose of Atwater is to educate in the departments of Electrical Engineering and the Social Sciences. There are workstations, lasers, ultrasonic imagers, power analyzers, and wireless transceivers. The type of building that Atwater is compared with the Campus Center is quite different because it is a department building. It has numerous lounges, labs, lecture halls, offices, and classrooms.

From these buildings we selected various rooms or sitting areas to examine. There are too many rooms in each building to critique them all so we decided to take a sampling. There are many types of sampling methods and these types fall under two categories nonprobabilistic and probabilistic. Probabilistic is when something affects the entire population and nonprobabilistic is when it affects only a specific group. Since we

need to know whether or not WPI's buildings have function to the community of people who use them we decided to choose from the types of sampling under the probabilistic grouping. The probabilistic approach offers four types of sampling: simple, stratified, systematic, and cluster. We decided to do stratified random sampling because we needed to compensate for the discrepancies in the architecture throughout Atwater Kent due to the new lecture hall renovations. In addition to this, in both buildings there are a multitude of different types of rooms so it only made sense that we would sample different varieties so as to get the most accurate conclusion. We concluded to do stratified random sampling because it is the most relevant and can help eliminate problems. Stratified random sampling corrects discrepancies by over sampling.[lvi]

Other possible sampling methods would have included simple randomized sampling. This involves randomly selecting your observation choices. For example ten out of the thirty rooms in a particular building would be selected The reason for doing this is that it eliminates any bias and we, the researchers, would have no say in what rooms were chosen. However, the ten rooms selected could all be very similar and some very important rooms like lecture halls or conference rooms might not be selected in the sample.[lvii]

Visual Analysis

To try and answer the question of how WPI's architecture affects the school through its style and function we decided that the most appropriate way to answer this would be to visually assess it. To visually assess it means to assess each one of its architectural qualities. Placement and use of walls, windows, furniture, lighting, and teaching apparatus are the types of things that will be reviewed. For example, lighting

will be looked at because if the lighting in a room is poor it can cause students not to use a room, to have a hard time concentrating, to fall asleep, and to not be able to see their work very well. Conversely, with good lighting, students have a tendency to be more fruitful. In addition to this, we will also be analyzing the outside of the building because the style and materials employed make a statement about the building and WPI. Students will also be observed in the environment for how they interact and function in the building exemplifies how the architecture of the building affects people. We will observe their interactions with others, their concentration level, and we will note whether or not they are doing work or relaxing.

We decided to do a visual approach because architecture is a visual art and it would not be logical to answer this question without critically engaging ourselves and others in the process. It is important to speak with those who know about the buildings since it will allow us to see what the aim of different aspects of the building are – yet it is important for us to be critically engaged ourselves because we have seen what other University buildings have to offer and are also WPI students. This task, however simple, will actually be quite difficult because what we conclude must not be based on whimsical belief but on critical findings. For this reason, it is important that we know what our own beliefs and biases are so that we may not let them get in the way of sound judgment. We are partial to the Campus Center because it is so new; however, it is imperative for us to remember that this does not make the Electrical Engineering Building less functional or of poor quality. It is essential for us to remember that we can compare the building to what it could be but to nothing else specifically on campus for its design is specific to its intentions and each building has its own utility.

Interviewing

The purpose of interviewing is to get a personal sense as to what the building is like and to acquire information about the buildings that we could not possibly find out from any book. We need to find out what WPI's goal was in the creation of these buildings. If we know this we will have some history about what was suppose to be and when we do the visual analysis we can assess what is there and whether or not it has function.

Jim McLaughlin (Appendix A), Director of the Campus Center, would be able to give us thoughts as to what WPI wanted to get from this building and what they have gotten out of its largest investment over the last 5 years. He also may know better then anyone what, if any, design problems the building has had, and he would know of any complaints people have made about the building, and what WPI has done in an effort to improve them.

Another lead we were given was to talk to either graduate students or professors with degrees in architecture. They would be able to instruct us on what a visual analysis included and how to perform one. We chose two professors, each with a different specialty: Professor David Samson for his knowledge of aesthetics and form, and Professor Roberto Pietroforte for his knowledge of functionality. Professor Samson directed us to books mostly found in our library while Professor Pietroforte (Appendix B) discussed the importance of continuity, location, and how to compare similar schools.

Seeing the architect of Atwater Kent is no longer of this world, and there is no director of the building, an interview with John Miller (Appendix C), Director of Plant Services would provide the most information about the history of the building, how it

functions, and the latest renovations. Knowing the history of the building, he will be able to explain why certain things were changed, when they were changed, and how the change was implemented.

Elizabeth (Zibby) Ericcson (Appendix D), the project designer for Shepley, Bulfinch, Richardson, and Abbott, was in charge of overseeing the design and construction of the Campus Center. Interviewing the architect of a particular building will give us insight to certain design specifications that to most would be unclear.

Using a technique known as snowballing we were able to gather more sources. When you snowball you simply ask the person you are interviewing if they have anyone else they might be able to direct you to that could help with your research. With this technique we were able to get additional interviews with Janet Richardson and Professor James Demetry.

Janet Richardson (Appendix E), Vice President of Student affairs, was referred to us by Jim McLaughlin. She worked with Elizabeth Ericcson and some others to survey students about the types of furnishings they wanted. We hoped she would be able to give us further insight as to why the Campus Center was designed the way it was.

Professor Demetry (Appendix F) is a lifelong member of WPI's family. He was a student here earlier in his life and has been teaching at the university for over 30 years. Being an electrical engineering student as well as a professor in the same field, Professor Demetry would be able to give us first hand knowledge of how the building has changed over the years.

Each person has a different area of expertise and because of this a different set of questions will be designed to target this area and gather as much information as possible.

The initial interview questions will be used as a guideline for the interview. If we, as the interviewers, feel there is something else we may be able to gather from the interview we would stray from the questions to gather that information and then return back to the questions at hand. With two people present for the interview, one person would take the role as the interviewer while the other takes notes and records any relevant information. By having one person assigned to interviewing and one to note taking, the conversation can flow more smoothly and thus be more personal.

The interviews will be scheduled for the beginning of C term with the questions being designed just prior to the conference. The questions will be designed to gather information both about the interviewees themselves, as well as, the buildings. We would like to find out the initial intent of why things were done, then go back and re-evaluate the buildings ourselves. This will be done to see if what was intended by the people associated with the buildings was ultimately accomplished.

The interviews will give us an opinion other then our own to compare with our findings. By selecting our interview subjects as people that spend a lot of their time in the building we will gather information from those people the most knowledge about the information.

One problem with interviews is scheduling. Peoples schedule may conflict with our own. Some people may only be able to meet for 30 minutes while an hour would be better for us to gather all of the information we need. With face-to-face interviews the interviewee may not be able to look up a given piece of information he would be able to if we conducted a phone interview. Questions must be asked carefully in order not to lead the person being interviewed to the answers we desire. By offering as little

information as possible in the questions we would force the interviewees to offer their own opinions and reply with less of ours.

Architects and Others as Resources

Most of the buildings on campus are older; therefore talking to the architect about the design is out of the question. Finished in February 2001, the Campus Center is an exception to this case. The building is only about 4 years old and for that reason we decided that talking to the architects who designed the building would almost certainly give us the most information about the building. After we have critically analyzed the building speaking with the architects who designed the building will confirm or disprove conclusions we have made and will help us to make an accurate conclusion of that building, and ultimately WPI. As with any type of research there are bound to be inaccuracies however, planning for these and knowing what they are will improve the quality of the research.

The inaccuracies that we are attentive of, like in the case with the Campus Center, are that when we speak with the architects we know that their statements could be biased due to their involvement on the project. Therefore, it is our role to ask questions that are not opinion based but more direct, such as asking questions about why the building looks the way it does. Assessing the building prior to the interviews will allow us to have predetermined ideas regarding why certain things were done with the building and then when they answer our questions they will conclude or disprove our original beliefs.

Atwater Kent, also known as the Electrical Computer Engineering building, until this past year, had not been renovated in a long time. Over the summer of 2004 many of the lecture halls were restored. However, the overall condition of the building is out of

date so when we speak to anyone about the building we need to make sure we address questions that talk about the overall condition of the building, not just the restored area. One challenge will be acquiring enough information about Atwater seeing as we can not get access to the drawing plans of the building.

The final phase of methodology is to analyze the data that has been collected by our initial visual analysis and interviews. To analyze the data we will need to assess what the intended function is, according to the interviewees, and what actually is, according to our visual analysis. By this we mean that the intentional design of the lecture hall, lounge, or other rooms might not be what they are actually used for today. If we observe that the design and use are one in the same, then we will conclude that it is functional because students and faculty are using it for its design. If we see that a room is used for something other then what it was created for then clearly we will conclude that its design was not functional. However, we will not just be looking for function because architecture is more then that. Since architecture is capable of evoking feeling and stimulating activity we will also be seeing if the aura of these buildings promotes the activity that the building was built to promote. For example, lounges are designed to give students a quite place to study, a place where they will not have the distractions that are present in a dormitory or apartment, if the lounges are not well used or if students do not seem to be focused on what it is that they are doing then perhaps the room was ill designed for its intended purpose.

Data Analysis

Portraiture

Once the initial observations and the interview process are completed we can then begin the process known as Portraiture. Portraiture is a type of analysis that seeks to fill the gap between art and science. The originator of portraiture, Sara Lawrence-Lightfoot, a well-known sociologist and Professor at Harvard University, describes it as creating a convergence of "aesthetic sensibilities, empirical rigor, humanistic, and literary metaphors."[lviii] She believes it to have created a relationship between two things that are commonly seen as polarities. Ultimately its process requires the essence of the subject to be captured, which in turn allows for some error in the particulars.

In her article *Reflections on Portraiture: A Dialogue Between Art and Science*, Lawrence-Lightfoot, describes a portrait that was done of her as not looking the way she had pictured herself but as capturing her flaws and things she would never have acknowledged about herself. Although our campus is inanimate the point is that portraiture does not always have to speak of the most liked attribute but the quality that we remember about it, the part that stand out and gives us something to associate with it.

Most people believe that the best example of anything is simply the object itself. This is why portraiture does not attempt to give a complete representation but rather it selects "some aspect of, or angle on, reality that would transform our vision of the whole."[lix]

The process of portraiture seems to be the most challenging. The procedure includes having the portraitist select the themes that will be used to paint the story. The portraitist must keep in mind however that what is left out is just as important as what is

included because the blank spaces also form the story. There must be a reason behind each selection and the way in which the story is told must be creative.[lx]

This type of research contrasts greatly with the traditions of quantitative and experimental research techniques where the researcher is not suppose to be heard but merely acts as a tool in conveying the material. In this type of analysis every endeavor is made to camouflage the investigator and any personal opinions and biases they might bring forth in the exploration.[lxi]

We will go about the method of Portraiture by revisiting the two buildings, similar to how we had at the beginning of the term. This time however, we will try and let the building leave an impression on us because data has already been collected about the buildings. This impression will be used to describe the *essence* of the building. Although this may seem like a daunting task the idea of Portraiture is to capture its key qualities that make it the building it is. Once we have done a Portrait of each building we can then begin to pull out similar qualities and make an overall assessment of WPI's architecture.

Portraits

WPI's Campus Center

Worcester Polytechnics Campus Center has two entrances ways on the main level. One entrance way is placed on either side of the front lounge. Walking through the entrance way located on the left side of the lounge will produce an immediate view of the school bookstore, Tatnuck Bookseller@WPI. This bookstore, from the outside, could sell anything to anyone. It's dark, almost warehouse like ceiling, is covered in an array of tiny white holiday lights. The interior walls, facing the lobby are floor to ceiling glass. This gives a very friendly and more spacious look to the building which might otherwise look very closed in.

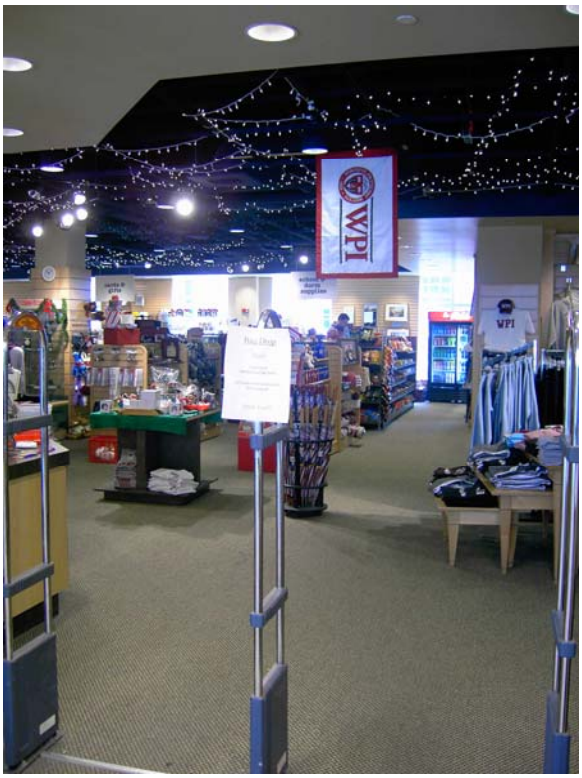

Figure 7 - Tatnuck Bookseller@WPI

The Class of 1946 Lounge is adorned lavishly in comfortable chairs and sofas. Accompanying them are very simple round coffee tables made of a light wood. The stone fireplace situated on the central wall gives the room a homey look. The homey look would not be complete without the color palate. The color palate, which mostly applies to the entire building, consists of burgundy, rust orange, navy blue, tan, and olive green. Although these colors are considered to be dark by some people, the overall look to the room is not overwhelming because of the type of wood used, the use of glass, and the type of stone used for both the outside of the building and for the fireplace.

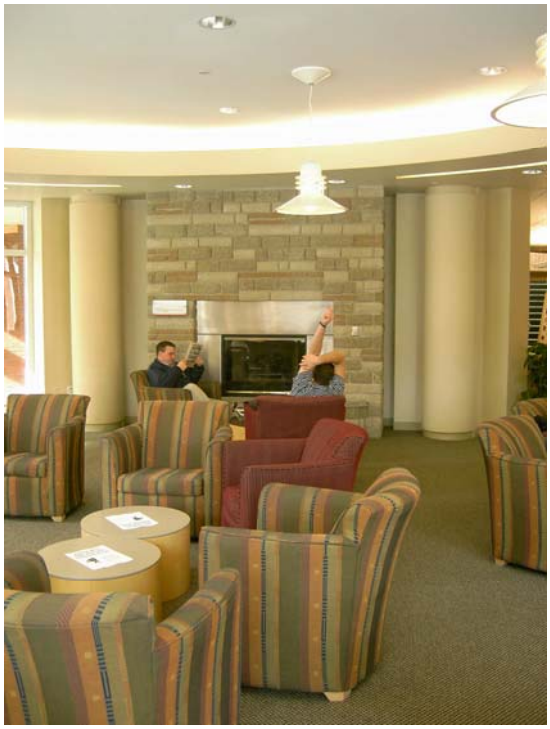

Figure 8 - Class of 1946 Lounge

The 1948 Café overlooks the garden level with a balcony that swings around the far side of it. Square tables, chairs, and café style stools and round tables are located in this area. There is a certain nonchalance about the area due to its lack of concern for

tidiness. The tables and chair are not bolted to the ground allowing for flexibility in arrangement.

The only accessible wing on the ground floor leads to student activities offices and to various directors' offices. Such offices could not have been located in a better spot in the building. Most traffic enters through the main level and those looking for these offices will immediately see the desk in the front lobby and from there, have only a short distance to travel to the offices. Offices located on the right side of the wing have a spectacular view of Higgins gardens and the remaining part of campus that is considered very important to WPI's history.

Natural light from a skylight illuminates the stairwell leading to the third floor. This stairwell is so bright that at times students and faculty may find themselves squinting as they make their way to the third floor. The shiny metal banisters and stone treaded stairs lead to the quietest of all floors. The open area at the top of the stairs has the same type of chairs and tables that are located in the 1946 Lounge, scattered about them. Carpeted floor spans in four directions. Opposite the stairwell is the Hagglund Room. This round meeting room is the larger of the two meeting rooms located on this floor. Its unconventional shape which is round, gives way to a magnificent view of some of the academic buildings. The smallest of the meeting rooms, the Mid-Century Room, although smaller in size, has a similar set up. It also posses a large round adjustable table, comfortable mobile chairs, and a spectacular view. The far wall looks out towards Higgins House and captures it in a way that shows just how remarkable it is. These rooms have VCR's, projectors, and audio equipment, to host various types of meetings.

The wing on this floor houses the remainder of the student organizations offices. Greens, blues, and neutral shades are used down this corridor perhaps evoking a more creative side to students. These rooms are generally the same size.

In addition, the third floor also houses the Odeum. This room, unlike many of the other rooms in the center which are named after their donors, is named after the Greek word meaning *gathering place*. Located on the plaque adjacent the door is a sign which reads, "…to exchange ideas for the purpose of education, entertainment, and social nourishment." This large "gathering place" has two dividers which allow the room to be more accommodating for the type of function being held there. The room is your basic rectangular shape with six large windows, a modifiable stage, podium, and projector screen. When the colors, lighting, and geometry of the room are compared with the rest of the center its look is very simple. For the diversity in age of the people the room will be hosting and the variety of events that are hosted there, the layout is exceptionally optimal.

Figure 9 - The Odeum

If the stairwell is followed back down to the ground level and then to the garden level, one will notice that the stairwell is no longer enclosed. The free stairwell has become only a banister and between this and the treads of the stairs is a glass enclosure. Towards the right of the staircase is the mail room, pool hall, and television area. This area has a very modern feel to it. Lights hover above booths and pool tables. Placed in front of the booths and separating this side of the garden level from the other, are two square shaped pillars with televisions in them. Behind the booths are pool tables, placed out of the way, so as not to be a distraction. Left of these are student mailboxes and the Mail room. Outside the mailboxes are two islands where students can sort through mail and prepare outgoing packages. These act as a divider between the mail area and recreational area so that students may get in and out of the building quickly.

Neighboring the stairs are two smaller conference rooms. The colors used in these areas are neutral and the lighting is of a good quality. They have projector screens for presentations and comfortable seating.

The remainder of the campus center on the garden level is dining area. Steel legged chairs and tables of different sizes scatter the area. One side of Forkey Commons is entirely made of glass. These glass panels let in vast amounts of natural sunlight while simultaneously presenting a fabulous view of Higgins house. This area can also be turned into a stage for performances. The overhanging balcony, Café area, has lighting equipment installed so that if a smaller area were needed for an event, there would be one.

Exteriorly, the building is very modern. It does not hide its curves but in fact flaunts them. WPI's Campus Center, embellishes the hills of Worcester. Most other

buildings on campus are just situated on top of the hill and their jagged edges do nothing but creep higher and higher. The Campus Center has fluidity about it. One can enter through the main level, walk done the staircase, exit the building, end up face-to-face with Higgins, and then continue on their journey.

Atwater Kent

The following story is a fictional account based on real experiences with Atwater Kent before the 2004 renovations:

> BEEP! BEEP! BEEP! Its 7:20 A.M. and I wake up to the sound of a truck backing up. OK it's my alarm clock, but its close enough. I reach over and hit the snooze button; after all I don't *really* need to take a shower every morning. Now its 7:50 and I wake up in a rush realizing I had just hit the snooze button 5 more times without even knowing it. I throw some clothes on that match about as well as an igloo in the desert.
>
> As I got outside I thought to myself, "Why did I only wear one jacket? I mean it is New England in January." After what seemed like an eternity I've reached the center of the quad. "I'm going to freeze to death", I think to myself. I start to do what I always do when I try to keep my mind of the changing colors of my fingers: guess how many steps it will take me to get to where I'm going. At 100 I reach the gymnasium, I press on. Now I'm at 130 and I realize yet again that I'm walking too fast to call a number out in my head and take steps at the same time. I start the count over at 30 and just remember that I've already reached 100 in my head. I'm at 200 and I contemplate walking straight through Salisbury Labs just to warm up a little even though I am already two minutes late.

Figure 10 - Entrance to Atwater Kent

Finally I enter Atwater Kent. Somehow I walk even faster then I was walking outside once I've entered the building. The bold, bright blues and reds that cover the walls and doorways make me feel small and confined. My heart beats more rapidly. I just want to make it to class so that this nightmarish walk will be over. I should have known the nightmare was just beginning.

Figure 11 - Color Palate in Atwater Kent

I entered the classroom and sat down in one of the last few rows not to disturb the class. The professor was drawing some diagrams on the chalkboard so I took out my notebook and copied them down. I think I got them down correctly, but it was very difficult with the poor lighting, the diagrams were barely visible. Shortly after, the professor instructed the class to take out their books and calculators. "Oh great", where am I going to put these. As it was my notebook alone was taking up 150% of the pull out desk space. Now I have to attempt to maneuver my book on my lap and use my calculator with my one free hand. CRASH! There

goes my book as it falls to the ground between my legs. So much for not disturbing the class!

As the minutes tick away I begin to feel more and more tired. The professor's voice is muffled by the sound of the heat trying to decide if it wants to stay on or shut off. The seats feel like your sitting on rocks, impossible to get comfortable in, trust me I tried. The only thing that's keeping me awake is the fact that I think I'm going to wet myself since I was in too much of a hurry this morning to go to the bathroom. Finally we are given a ten-minute break.

I get up and sprint to the bathroom. There is a line wrapping down the hallway. I can't wait in this I need to go *now*! A see a girl in the line next to me get up and go to the third floor. "Good idea", nobody is up there. I follow close behind her till she makes it to the "ladies" room. Am I missing something? There is the "ladies" room. There is a closet. There is the stairs. I don't have time for this. I was already late getting to the class now I'm going to be late returning to it. Sweat is pouring down my face. And just 15 feet below I thought it was freezing in here. I walk down the hallway and finally find the "men's" room. This thing couldn't be further away from the "ladies" room if it was in another building.

I can't wait to get back into my bed. The class is packing up their belongings and I am happily joining them. As I am about to leave the building my comfort level begins to rise, even though I know I am about to enter freezing temperatures. I look around on my way out the door and questions come to mind. Why is this wall red, and this door blue, and that wall green? What are these arches for? I have seen big powerful arches before, but those are to support large objects traveling through them. The only thing traveling through these arches are people. The passageways are filled in with walls and windows. Perhaps they used to serve a purpose that is no longer necessary. And this strange machinery; I have never seen anything like it. What is it? And why is it here? It isn't operational, is it?

Figure 12 - Train Controls in Atwater Kent

Now while the recent renovations have helped the functionality of the building the form remains mostly the same. Few students know that almost $1million have been devoted to repairing the roof of Atwater. The renovations that people know about are to the classrooms and lecture halls. Transformed from the archaic spaces that used to occupy most of Atwater, these building now are the most aesthetically pleasing rooms in the building. Students are now awake and attentive while before they were tired and lacks. When you step into one of these rooms it is as if the school has seen the light, literally. The illumination of the rooms make you feel involved and interactive. The technology is state of the art. It is almost as if you are stepping into a time machine when you depart the newly renovated rooms and enter the hallways covered in bold primary colors.

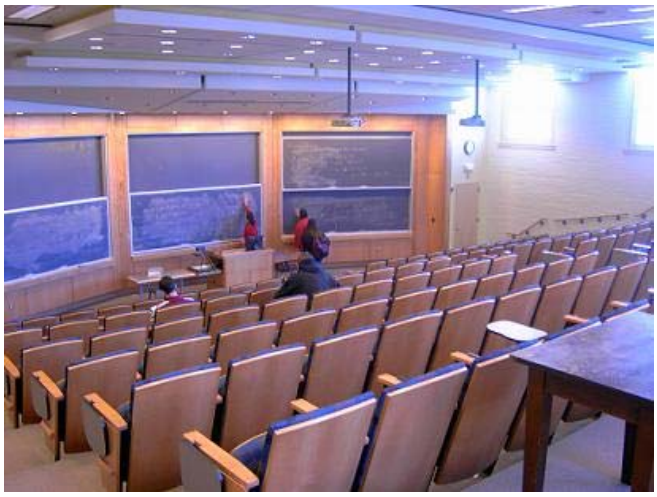

Figure 13 - Newell Hall in Atwater Kent

Conclusion

The most simplistic explanation of *Why Architecture?,* is for it to function as human shelter. However, time has allowed it to become something more powerful then that, Art. Through human interpretation, imagination, and creation, architecture has made enormous advances since primitive times when its single function was for protection. Its structure acted as a guard against Mother Nature and predators. Today however, architecture serves a greater purpose.

Acting as some of the largest manmade structures today, buildings have the ability to make people feel protected, impressed, and overwhelmed. Buildings have the ability, to alter people's moods and put them into a certain state of mind. The state of mind you are put in at a church, athletic center, and home are all distinctively different and it is partly due to these buildings that you are transformed into that state. The word *partly* is used because you enter that state for the activity you are going to be engaged in. If you are going to court you are going to enter appropriately dressed and with a certain conduct. You enter the building that way for the grounds to why you are there and to the type of architecture you can anticipate. The look of a courthouse is very honest and respectable and so when people enter it they are mindful of the way they act. Architecture has a great affect on a person's state of mind and it is because of this that architecture is particularly important on college campuses.

Minds of the future are being molded at universities around the world and it is at these institutions where architecture plays an extremely critical role. Libraries, dormitories, admissions buildings, campus centers, academic buildings, athletic facilities, and religious centers are all very different buildings, nevertheless integral parts to a

campus setting. It is for this reason that is particularly imperative to design the buildings so that they will allow for maximum effectiveness on students, faculty, alumni, and prospective students.

The qualities that come to mind when strolling through WPI's Campus Center are communal, developmental, convenient, fluid, and modern. The Campus Center acts like a community center by fostering interaction between individuals and groups. Students always have a place to meet friends, project groups, or Professors. It is a space that fosters growth, learning, and socialization. The Campus Center, because it houses group organization offices, a food center, mailroom, lounges, meeting rooms, and the bookstore, promotes personal growth among WPI students. The variety of services offered at the Campus Center allow already stressed out students to have a more convenient lifestyle.

On the other hand when you walk through Atwater Kent for the first time the immediate things you notice are that it is illogical, outdated, inconsistent, and historical. The feeling you get here is the exact opposite of how you feel at the Campus Center. The building gives you the feeling of the unknown, particularly for someone who does not spend a great deal of their time in the building. Atwater Kent does not have the fluidity that you might find in well organized buildings. If you are looking for something in particular, you might not know where to look. It has an unfinished feel to it because of the recent renovations and due to the fact that everything in the building, from the colors to the lighting are out of date.

Worcester Polytechnic Institute, being an engineering and technological university, has a building for nearly all of the main majors in addition to all of the typical

college buildings. Most of the buildings on campus have an early 1900's industrial look to them while the remaining buildings have a bolder 1970's look, with the exception of the latest building, the Campus Center.

Clearly the two buildings we have explored are vastly different. Differences include age, function, style, and location. The Campus Center is new, centrally located, and was built for one purpose which it continues to serve, while Atwater Kent is over 100 years old, located on one of the outreaches of campus, and has been continually evolving to suit new purposes. The gymnasium, water fountain, educational buildings, and even Higgins House border the Campus Center. Meanwhile only streets, parking, and other non-recreational buildings border Atwater Kent. These traits make the two buildings very different.

Figure 14 - Atwater Kent Hallway

Figure 15- Forkey Dining Commons in the Campus Center

Among the buildings on campus, the Campus Center is the one jewel. Perhaps this is because it is marked by the use of a lighter colored stone or because its appearance resembles an "outside-the-box" design, whatever the reason for its distinctiveness, this building undoubtedly stands out among other WPI buildings. With their four stories, square frames, and red brick facades the other buildings remain a far cry from the innovative designs that we currently see at Massachusetts Institute of Technology and Illinois Institute of Technology.

Ideas that were incorporated into the center were innovative and accommodating to WPI's needs. These needs were based on what students, faculty, staff, and alumni described. So what does that say about WPI's perception of their heritage and tradition? If the people wanted something so drastically different this could only mean they either do not care about or do not like what we have on campus. It could have been possible for the school to create a modern building and kept the continuity with the other buildings, as is the case with new buildings at Ivy League schools.

Elizabeth Ericcson, Principal in Charge, from Shepley, Bulfinch, Richardson, and Abbott, described the feel of the center as offering the students, choice, a sense of community, a way for students and faculty to relate, and inviting toward the public. Each of these traits adds something to the WPI campus. In no other building do we even get a similar feeling. This is perhaps the reason why the Campus Center is so loved. One building though, no matter how much students appreciate it, can not compensate for the rest of a campus that is lacking.

When each building on WPI's campus is pulled from the whole, most of them have at least one good quality about them. However, when the buildings are put together

to comprise a campus they are suppose to look united, and WPI's do not. At a university where there is no campus and the buildings are spread over a large area, it is not a problem if the campus looks disconnected. The spaces in between fill those gaps and it becomes unnoticeable that the buildings are different. When a college has a campus, a small one at that, and the buildings are vastly different, the campus looks unconnected and disjointed. The statement this makes about the school is that the university is not in tune with the students. How can one assume that the administration is clued in to what the student body needs if the campus seems like a conglomerate of buildings just thrown together? If the buildings are random and illogical it would seem as if the university had not put time into its additions and evaluated its affect on prospective students.

The Campus Center, however, says something about the progression in the administrations way of regarding its students and program. WPI's motto has become, "The University of Science and Technology. And Life." This motto truly could not have been used had the Campus Center not come about. The center and new motto are both signs that WPI is expanding its idea of what it means to educate. It seeks, no longer, to just educate about science, but also about life. This center promotes campus involvement and student interaction both of which older buildings do not encourage. Atwater Kent can be described as a building that is purely used for educational purposes. Although newly renovated classrooms enhance the functionality of the building, the overall atmosphere is lacking student interaction. If WPI intends on using this motto, we believe that its architecture should reflect this.

Appendices

Appendix A - Interview with Jim McLaughlin (Campus Center Director)

1/13/05

Background

1) How long have you worked for WPI?

- 5th year hear
- Hired July 2000
- Opened March 2001

2) Have you worked anywhere else? If so, where?

- Campus Center: Plymouth State
    - 14 years
- Framingham State (assistant activities)
    - 6 years
- Bridgewater State (night operations manager)
    - 3 years

3) What is your educational background?

- BA: Bridgewater state
- MA: Fairfield University

WPI

4) Why was the Campus Center Built?

- Didn't have one place for social gatherings
- No place for center of student activities
- Need to support all members of students/faculty/staff/alumni/and guest
- For everyone to use
    - Not called student center
- All members

    b. Do you think it fulfills that function?

        - Yes

    c. Why or why not?

- WPI did well on 40 focus groups to help determine what was needed
- Campus Center committee visited other campuses
  - Plymouth state
  - # of others
- Holds over 3500 meetings/activities/events every year
- View it as program, not a building
- "living room of university"
- Feel of building makes students want to be here

5) Do you get any complaints about the Campus Center?

   a. If so, what are they?

      - Space for the 130 student activities
      - Storage space
      - Trouble advertising

   b. Was anything done to fix the problems?

      - New flat panel TV
      - Easel

6) Who picked out the furniture, carpeting, etc.?

- Janet Richardson had students and others test furniture.
- Joe Rondinelli (Interior designer for Shepley)

Closing

7) Do you know anyone else we could speak with or recommend any other sources that could help with our project?

- Janet Richardson

Appendix B - Interview with Roberto Pietroforte (Civil Engineering)

1/14/05

- Compare with similar schools
    - Size
    - Location
    - Type of school
- Location of buildings
    - Travel from building to building
- Look at Master Plan and its development through the years
- Analyze Worcester in 1865 and 2005, how has the city changed?
- Comfort of space
    - Scale/background
    - Get lost in large buildings

Appendix C - Interview with John Miller (Director of Plant Services)

1/17/05

Background

1) How long have you worked for WPI?

- 22 ½ years

2) Have you worked anywhere else? If so, where?

- US Gov/Navy (Vietnam)
- 11 years American Optical Corp.

3) What is your educational background?

- Bachelors of Science, Mechanical Engineering
- Masters, Industrial Management

Atwater Kent

4) What do you know of the history of Atwater Kent? (initial design, changes)

- Wanted it more exotic
- 2 wings were supposed to have skylights
    - Never happened not sure why

5) Would you consider the facilities (labs, lecture halls, offices, etc.) in Atwater adequate?

- Depends on use
- Fairly adequate
- Requires room
- More additions were done then Salisbury or Kaven

6) What was the purpose of the recent renovations?

- Restored roof
- Slate with insulation
- Rebuilt cupolas

    a. Have the changes fixed the problems?

        - Most

7) What company did the recent renovations?

- Consigli Corp. did classrooms
- Titan Roofing did roofs

    a. Do you know roughly what the costs were?

        - $1.4million for classrooms
        - $980,000 for roofs

8) Are more changes planned in the future?
    a. If so, what are they?

        - More chilled water to help cool classrooms
        - Part of a larger project with Fuller Labs

    b. If so, when?

        - This summer

9) Why are such bold colors used?

- Styles/colors related with the times

    a. Have they always been used?

        - Since the renovations in the early 1980s

10) Do you have any ideas about why buildings are the way they are?
    a. If so is there anything you would change about Atwater Kent?

        - Modernize electrical distribution
            - Old, capacity is lacking
        - Flooring/stairs are wearing out
        - More bathrooms, poorly designed

Closing

11) If necessary could I contact you later for further help?

- Yes

12) Do you know anyone else we could talk to or recommend any other sources that could help with our project?

- Professor Ore
    - Dept. Head
- Professor Demetry
    - Been here a while

Appendix D - Interview with Zibby Ericcson (Principal in Charge)
1/21/05

Background

1) How long have you worked for Shepley, Bulfinch, and Abbott?

- 23 years (principal)

2) Have you worked anywhere else? If so, where?

- Terry, Dean, and Stewart (Boston, Ma.)
- Earl Flansberg Ericcson

3) What is your educational background?

- Mt. Holyoke
- Columbia School of Architecture (BA)

Campus Center

4) What is the logic behind the layout of the Campus Center? (Offices on the third floor, lounges on the second floor, dining/pool hall on the ground floor)

- Student body, administration, diverse group with diverse needs
- 3rd floor large groups conference center (trustees use)
    - Close 3rd floor off
    - Social flexibility
- Main level 24/7 for students/office area
    - First floor: community to students (lounge, bookstore)
    - Tatnuck bookstore, coffee, books (leased space)
    - Wanted social gatherings
    - Balcony (informal)
    - Large space for student table set ups (advertising)
- Bottom floor
    - Question how to deal with meals if students already buying a meal plan
        - Variety of food: Healthy options, cultural food
    - Post office
        - Put in back so student had to travel through whole building
    - Pool hall
    - Terrace
        - Outdoor environment
        - Music/food/relationship with Higgins House
    - Pathways
        - Main entrance: 2 doors – less formal

        - Enter from library or quad.
        - Not monumental door – relaxed
    - Coffee placed for easy access

5) What is the feel of the building/campus?

- More choice
- Sense of community
- Way for students/faculty to relate
- Invite public in

6) Why design the conference rooms in a circular shape?

- Campfire metaphor
- Form for community
- Square rooms are not about getting together
- Great 360° views
- I (Zibby) came up with idea
- Appreciate each other

7) What was the intent with the design of the outside of the building?

- Facing library garden space
- Entry garden (cross street)
- Building designed for phase 2
    - New gymnasium
    - Allow for lateral expansion
- Because on hill, bring Higgins house into visibility
    - Precious sight to WPI
    - Pine trees
    - Heart of campus
    - Hard for someone to imagine: building there with no trees

8) What was the intent with the colors used?

- Interior designers with Shepley chose them
    - Along with trustees
    - Palette of colors come up with
    - Committee decision
    - Palette chosen each year by industry
- Harmoniously put together
- Lighting very important (her opinion)
    - Consultant helped but she chose lights
    - They described effects of lights
    - She chose best fixtures for environment
    - Decision based on looks, type, and effect

Closing

9) If necessary could we contact you later for further help?

- Yes

10) Do you know anyone else we could talk to or recommend any other sources that could help with our project?

- Contractor – Cutler

Appendix E - Interview with Janet Richardson (Vice President of Student Affairs)

1/26/05

Background

1) How long have you worked for WPI?

- Since 1980

2) Have you worked anywhere else? If so, where?

- Penn State (PA)
- Oneonta (NY)

3) What is your educational background?

- BS in Education – Salem State
- MA – State University of NY (Albany)

Campus Center

4) Why was the Campus Center Built?

- Long term heed for additional space, community space on campus, food services, and a relaxed place for students to join

    a. Do you think it fulfills that function?

        - Yes

    b. Why or why not?

        - Because of the program here
            - Food, mailboxes, bookstore
        - Creates energy
        - Location is great
            - Between athletics, residents, and classrooms

5) Before the Campus Center was built how were students, faculty, or professors asked what they would like to see in the new center?

- Yes
    - With open forums, surveys, committees, open campus meetings

- Meetings with custodians, social committees, alumni, sororities, fraternities
- "What was missing?"
- When students visited other schools if they had to do it again what would change?

a. What sorts of things did the students ask for?

- Chairs – came in and filled out surveys

6) Do you get any complaints about the Campus Center?

- Requested
  - Storage/files
  - Meeting space
- General space
  - 3rd floor
  - Club room
- People don't have any place to make it theirs alone
  - Not what was intended
- Not enough space for all clubs

7) We learned that when the Campus Center's furniture was picked out students/faculty were asked to test furniture. Could you describe this process a little bit?

- Used wedge
  - Tested chairs for comfort
    - Not colors/fabrics
- Surveys
- Patio furniture tested too
- Committee chose artwork
  - Assisted by art representatives
  - Catalogs
  - Talked about types of art
    - Water color
    - Ethnic
    - Etc.
  - Guidelines set by interior designers

8) What was the intent with the style/look of the Campus Center?

- Bottom floor: loud
- 2nd floor: loud – with entrances/exits and meeting rooms
- Top floor: meeting rooms, functions
- Feel of building expressed through colors, fabric, paint

9) What would you say is the most liked aspect of the Campus Center?

- Students
    - Idea of Campus Center
    - Fact that its all in one place
    - Convenience factor

Closing

10) If necessary could we contact you later for further help?

- Yes

11) Do you know anyone else we could talk to or recommend any other sources that could help with our project?

- Samson (on committee)

Appendix F - Interview with Professor James Demetry (Electrical Engineering)

2/3/05

Background

1) How long have you worked for WPI?

- Since 1971

2) Have you worked anywhere else? If so, where?

- Out in California 1960-70

3) What is your educational background?

- WPI

Atwater Kent

4) What buildings were around when you went to school at WPI?

- Riley was only dorm
- No library
    - Alden held books
- Olin was built while here
- Atwater was strictly EE until 10 years ago when some social science was brought in

5) Do you think Atwater Kent was functional when you were here? Do you still feel this way?

- Yes, back when it was all electric power; no computers
- Yes, its been expanded to meet needs of faculty, labs, computers

6) How does the building feel before and after the most recent renovations?

- Feels like home
- Room numbers are a little weird
- Great additions

7) Do you personally have any complaints or suggestions about the building?

- None

8) What are your feelings on the machinery in the lounge?

- Beautiful
- 1/3 of what it used to be
- Ties to history of the building
- Doesn’t want any more of it to be taken out

Closing

9) If necessary could we contact you later for further help?

- Yes

10) Do you know anyone else we could talk to or recommend any other sources that could help with our project?

- Lora Brueck: library
- Fred Looft: EE department head

[i] H.W. Janson, History of Art. (New York: Harry N. Abrams, Inc, © 1977). 10-18

[ii] "The Story of Jack the Dripper," 25 Feb. 2005 http://www.jackson-pollock.com/uniquestyle.html

[iii] Oswald Hanfling, Philosophical Aesthetics: An Introduction. (Oxford, UK: The Open University, © 1992). 3

[iv] Hanfling, 1992. 4-9

[v] Ellen Dissanayake, Art and Intimacy. (Seattle, Washington: University of Washington Press, © 2000). 184-185

[vi] Ibid

[vii] Dissanayake, 2000. 30

[viii] Dissanayake, 2000. 38

[ix] Ellen Dissanayake, What is Art For?. (Seattle, Washington: University of Washington Press, © 1988). 35

[x] Paul-Alan Johnson, The Theory of Architecture. (New York, New York: Van Nostrand Reinhold, © 1994). 75

[xi] Johnson, 1994. 25

[xii] Johnson, 1994. 80-91

[xiii] Witold Rybczynski, The Look of Architecture. (New York: Oxford University Press, © 2001). 3-4

[xiv] Ibid

[xv] John Lobell, Between Silence and Light: Spirit in the Architecture of Louis I. Kahn. (Boulder, Colorado: Shambhala Publications, Inc. © 1979). 56

[xvi] Lobell, 1979. 1

[xvii] Jackie Craven, "Architecture in Prehistoric Times," 10 Oct. 2004 http://architecture.about.com/od/prehistoric/

[xviii] "Characteristics of Egyptian Architecture," The Columbia Electronic Encyclopedia, (6th ed. Copyright © 2005, Columbia University Press). 10 Oct. 2004 http://www.infoplease.com/ce6/world/A0857912.html

[xix] "Ancient Greek Construction Methods," The Columbia Electronic Encyclopedia, (6th ed. Copyright © 2005, Columbia University Press). 10 Oct. 2004 http://www.infoplease.com/ce6/world/A0858469.html

[xx] "Byzantine Architecture," The Columbia Electronic Encyclopedia, (6th ed. Copyright © 2005, Columbia University Press). 10 Oct. 2004 http://www.infoplease.com/ce6/ent/A0857092.html

[xxi] "Structural Characteristics," The Columbia Electronic Encyclopedia, (6th ed. Copyright © 2005, Columbia University Press). 10 Oct. 2004 http://www.infoplease.com/ce6/world/A0860775.html

[xxii] "Characteristics of Gothic Architecture," The Columbia Electronic Encyclopedia, (6th ed. Copyright © 2005, Columbia University Press). 10 Oct. 2004 http://www.infoplease.com/ce6/ent/A0858436.html

[xxiii] "Architecture of the Renaissance," The Columbia Electronic Encyclopedia, (6th ed. Copyright © 2005, Columbia University Press). 10 Oct. 2004 http://www.infoplease.com/ce6/ent/A0860693.html

[xxiv] "Baroque Architecture," The Columbia Electronic Encyclopedia, (6th ed. Copyright © 2005, Columbia University Press). 10 Oct. 2004 http://www.infoplease.com/ce6/ent/A0856855.html

[xxv] "Victorian Style," The Columbia Electronic Encyclopedia, (6th ed. Copyright © 2005, Columbia University Press). 10 Oct. 2004 http://www.infoplease.com/ce6/world/A0850829.html

[xxvi] Jackie Carven, "Architecture Timeline: Explore Architecture Through the Ages" 10 Oct. 2004 http://architecture.about.com/cs/historicperiods/a/timeline.htm

[xxvii] Ibid

[xxviii] Ibid

[xxix] Ed. Michael K. Hayes, Architecture Theory: Since 1968. (Cambridge, Massachusetts: The MIT Press, © 1998). 379

[xxx] Johnson, 1994. 247-248

[xxxi] David J. Neuman, Building Type Basics for College and University Facilities. (Hoboken, New Jersey: John Wiley & Sons, Inc. © 2003). 24

[xxxii] Neuman, 2003. 1

[xxxiii] Neuman, 2003. 26

[xxxiv] Ibid

[xxxv] American Institute of Architects Committee on Architecture for Education. Educational Facilities: 1995-1996 Review. (Rockport, Massachusetts: Rockport Publishers, Inc. © 1996). 140-141

[xxxvi] "The Benjamin and Mae Volen National Center for Complex Systems," 25 Feb. 2005 http://www.bio.brandeis.edu/volen/

[xxxvii] American Institute of Architects Committee on Architecture for Education. Educational Facilities: 1995-1996 Review. (Rockport, Massachusetts: Rockport Publishers, Inc. © 1996). 136-139

[xxxviii] Photo by Patsy Sampson "Ray and Maria Stata Center," 25 Feb. 2005 http://www.csail.mit.edu/events/news/stata.html

[xxxix] Megan Vandre, "Stata's Symbols." Technology Review, (© May 2004). 11

[xl] Vandre, May 2004. 41

[xli] Vandre, May 2004. 12

[xlii] Vandre, May 2004. 13

[xliii] Ibid

[xliv] "Why Shouldn't Architecture be fun?," 25 Feb 2005 http://web.mit.edu/spotlight/stata2/

[xlv] Johnson, 1994. 127

[xlvi] Klauder, Charles Z., and Herbert C. Wise, College Architecture in America. (New York, New York: Charles Scribner's Sons, © 1929). Forward

[xlvii] "Center for Biotechnology and Interdisciplinary Studies," 25 Feb. 2005 http://www.rpi.edu/research/biotech/

[xlviii] Margaret M. Knight, "Master Builder." Rensselaer, (© Fall 2003). 26-27

[xlix] Ibid

[l] "About the Society," 25 Feb. 2005 http://mies.iit.edu/about/crown_hall.html

[li] Carter Wiseman, Shaping A Nation: Twentieth-Century American Architecture and It's Makers. (New York, New York: W. W. Norton & Company, Inc. © 1998). 174-175

[lii] Neuman, 2003. 19

[liii] Neuman, 2003. 18

[liv] Neuman, 2003. 36-37

[lv] "The Mission of WPI," 7 Oct 2004. http://www.wpi.edu/About/statements.html

[lvi] "Sampling," 7 Oct 2004. http://faculty.ncwc.edu/toconnor/308/308lect03.htm

[lvii] Ibid

[lviii] Sara Lawrence-Lightfoot, "Reflections on Portraiture: A Dialogue Between Art and Science," Qualitative Inquiry. (© 2005) 6

[lix] Ibid

[lx] Lawrence-Lightfoot, 2005. 10

[lxi] Lawrence-Lightfoot, 2005. 86