DESIGNING FOR A PARADIGM SHIFT
RE-IMAGINING HIGHER EDUCATION

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INTRODUCTION

Education has always been a big influence in my life. Growing up with two teaching parents gave me a distinct appreciation for learning. It is my hope that this project helps to further the thirst for knowledge that they instilled in me and inspire others to grow a passion for their own educational pursuits. I believe that there is a great potential in this generation and the ones to come through a commitment and love of the work they produce. Ignorance is perhaps the biggest shackle that our society has and ever will face as a species. Overcoming an educational gap will become the next big hurdle that demand more from the contemporary university.
SIGNATURE PAGE

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THESIS ABSTRACT

An analytical re-imagining of the higher educational model through architecture has the ability to redefine the fundamentals of collegiate study. Traditional higher education pedagogies impede on meaningful education and have become laden with outdated infrastructure. Changing the way we think about education is vital to creating better students. This thesis attempts to design a new higher educational facility to improve upon academic efficiency among students. The result of this process applies descriptive and evaluative research into an active-learning-based classroom for the city of Williston. Collecting and organizing big data sets, provides a clearer understanding of successful design strategies. These strategies are then applied in a sequence which aids the iterative design process. Using a design methodology, spatial organization identifies relationships between the various academic zones found throughout building organization. Correlations between the mesosystems and microsystems that separate and define academic, social, and collaborative spaces can be generalized through an iterative design process. Design becomes a powerful tool with the ability to recognize the importance of the interconnecting spaces that synthesize various areas of the building. Previous research becomes condensed in design and must be reformatted in a cohesive fashion so that new ideas can be discovered during the process. Educational requirements of the active pedagogy are therefore translated into physical concepts which then become the basis for a new line of investigative design. In this effort, this project hopes to make a stronger connection to students and give them a better education than previously envisioned. Educationists our future is imperative to preserving it.
Constructing the setting for which a project shall adhere to, facilitates a focused design process. This narrative, acts as the bones of the project and will guide the remainder of the thesis investigation in a surgical manner. The project possibilities are identified early in a holistic thought process.
THESIS EXPLANATION

Although there are abundant scholastic benefits to pursuing higher education, the effects can be felt on a macrosocial level because higher education creates more independent people. An active learning pedagogy that focuses on contextualized problem solving reinforces more effective problem solving and analytical thinking skills than traditional education. This is due to the lecture style format placing less responsibility on the student and is, therefore, less effective as a delivery method. Active learning forces students to become more involved and develop a deeper appreciation for their education. Educating our future in this way is imperative because this helps to create individuals who are more likely to pay higher income taxes, remain out of jail, and contribute more to the common welfare of society. This type of demographic shift helps to establish new paradigms that society can achieve and encourages new ways of thinking that drive the human condition forward in a positive fashion.

The current higher education model, although satisfactory, creates a disconnect between students and their education. There is a potential to create a more effective educational model and as such, there is a need to develop and establish a new active learning classroom prototype at the collegiate level because it has a higher potential of creating better students, who have better chances of solving the complex problems in the world today.

Studies have shown that the higher levels of education correlate to higher wages, increased employment opportunities, and increased possibilities of obtaining health insurance. Other benefits have been shown to include a wider societal impact. Individuals who receive higher education lead healthier lifestyles, take on more leadership positions, and spend more time with their children during critical developmental stages. Therefore, higher education has the responsibility of not only propelling individual student success, but also mitigating societal issues. In order to accomplish this, it is time to reexamine the classroom and help redefine what the higher educational system can look like. An active learning pedagogy helps students become more connected to their education and create better students. This teaching methodology demands the built environment to foster a higher collaboration among students and the allow for context based learning opportunities among classrooms.

THESIS PRECEDENT

The typology of this project will consist of a higher education building that abandons traditional lecture hall formats for active learning classrooms. These classrooms are meant to push the boundaries of collaboration among students by utilizing innovative technology in conjunction with the built environment. Presently, many campuses have experimented with these ideas, but it is my hope to dedicate the design of an entire building to the refinement of the higher education system. Combining the basic principles of traditional lecture hall formats with the ideals of the active learning pedagogy, helps to inform the basis of a new educational model. This project aims to utilize successful campus strategies to create a cohesive learning environment that is inviting, engaging, and effective.
PROJECT EMPHASIS

Emphasis will be placed upon creating appropriate classroom conditions that exemplify the active learning pedagogy throughout the building. These classrooms need to foster diverse sense of collaboration and learning among students by enabling instructors to create an environment that suits their teaching needs. The study and development of these classrooms will be imperative to the building’s success. They must also take full advantage of technological achievements that can help aid in the educational process. Creating a relationship between the active learning classrooms and the technologic achievements is necessary for a cohesive design which will utilize, but not rely upon, technology. Consideration of the student experience throughout classrooms and the interconnecting spaces is critical to encourage social interaction throughout the project.

PROJECT GOALS

The goals of my thesis hope to make a difference in the lives of future college students and to act as a prototype for new educational thinking. My project will attempt to fit into the context of Williston, but also try to reinvent the built character of Williston State College. Furthermore, this thesis will act as a model of sustainability by designing with the landscape as well as introducing advanced active systems within the building. To minimize the ecological impacts, this project will develop a strong sense of passive energy principles as well as the implementation of active technologies to aid overall energy efficiency. Furthermore, energy efficiency will be driven by using LEED strategies as guide to create a sustainable environment. There should be a strong sense of the active systems that will be visible to visitors of the building to reinforce that the building is state-of-the-art.

PROJECT CLIENT

This project will exist on the campus of Williston State College, and as such, its users will consist of the students that go to that campus. Furthermore, it exists within the larger region of the Williston city limits and should be adjusted to conform to the area. An estimated 985 students enroll there annually and my building will help to accommodate about 16% of them to help alleviate the need for general classroom space. An additional percent of the users will be the faculty and staff. Strong consideration for the faculty and student relationship will demand attention to shared spaces and casual meeting spaces throughout the building. The specific client of this building will be the campus facilities manager of Williston State College. Coordination among the client’s vision and most current masterplan will be critical to the success of the implemented design. Adherence to the goals and emphasis of the project will be the best way to serve the client’s needs.
PROJECT JUSTIFICATION

The responsibility of improving the welfare of the public has fallen upon architecture since the origins of the profession. To best serve the public, architecture can facilitate the growth of ideas through educational facilities. These facilities will be challenged to contain the human curiosity and help others to develop a thirst for knowledge. Architecture has a duty to provide the best educational experience for students and help them cultivate their talents and skills. Our future rests in a robust education to solve the complex problems of the world and drive the human condition forward. By contributing to the knowledge of others and eliminating ignorance, everyone receives benefits whether they are direct or indirect.

Education has been a very important aspect of my life. My family consists of generations of educators that have instilled a value of knowledge and creativity. Obtaining a four-year degree has been one of the most rewarding experiences of my life, but I have often imagined a more cohesive system could do so much more. This change in educational delivery is best suited through a comprehensive built environment that supports and furthers the ideas of the educational pedagogy. As a student myself, I have formed my own opinions about the higher educational system’s role in my professional development.

Creating this educational prototype will challenge me to demonstrate my full design sensibilities and creativity because education has been reexamined in many ways. I will be striving for a new model that mixes new ideas, old ideas, and a technologically advanced infrastructure. Potentially, this project could exist within a future that is not fully realized, and yet, the project should still fit the context of current Williston in some way. This will demand a more rigorous understanding of teaching pedagogy, dynamic social interaction, and supplemental architectural strategies within classroom design. Bringing all of these elements together in a significant way will truly test my versatility as a student and a designer.
DESIGN METHODOLOGY

A more efficient higher education classroom prototype will require an analytical design research methodology. To do this, I will examine current and existing campus models and design a new model that encompasses the spirit of classical teaching methods but is free from the preconceived notions of the lecture hall. This categorization of education buildings and their effective aspects will help to drive and influence the design of the project. Using an evaluative research methodology, I will more easily distinguish the successful factors of educational design. These factors will be compared among each other to determine what the best set of these instances is and why they work well together. This methodology will be coupled with a descriptive research process for a holistic approach to my investigation. Through the descriptive research, I will gather quantifiable data in the hopes to compare economic, academic, and statistical trends throughout higher education.

DESIGN PROCESS DOCUMENTATION

To record and track the progress of this methodology will be a rigorous iterative design. Critical design decisions help to organize successful elements into broader categories while unsuccessful ones are brought to light and scrutinized for integrity. Decisions will be based on the production of models, drawings, and quantitative research. By mimicking the processes of active learning pedagogy, I hope to have a greater understanding of how to design for it. Adapting knowledge to contextualized problems will allow the research to find its proper medium in design and the iterative process will help keep creativity flowing so that I may find the best possible design solution. Further progression will be formed through the evaluation of existing educational models. Assessing the principles by which educational institutions function can help reveal relationships between active learning pedagogy and traditional pedagogy.
PROJECT SCHEDULE

- Inquiry
- Complex investigation
- Analysis
- Inventory
- Proposal expansion
- Space allocation
- Justification
- Project maturation
- Space & massing
- Site solutions
- Environ. factors
- Floorplans, elevations, etc.
- Materials, structure
- Sections, MEP, details
- Model building
- Deliverables
- Presentation

PRELIM
RESEARCH
SCHEMATIC
DEVELOPMENT
PRESENTATION
In order to maintain a substantial level of progress, the schedule shown on the left will manage the succession of the next semester. I’ve allocated the time to conduct detailed research during the initial weeks in an organized procedure. Specifically, the research will develop until the last week before spring break. By this time, my schedule will utilize the findings of the beginning and interpret them through schematic design. Although the schedule leans more on the research focused aspects, its composition is mostly split between research and design elements.
Preliminary areas of inspiration and research are condensed into an analytical paper. The research paper sets a tone for the project by outlining key concepts and ideas in a detailed fashion. Collecting my initial findings in this manner broadens the scope of research overall.
Higher education has been tasked with creating generations of free thinkers to shape the industries and ideas that will define our culture. Presently, the model of higher education utilizes a traditional approach that is inefficient when compared to more engaging pedagogies. Current educational models should abandon classical teaching methods in favor of a new active learning pedagogy because the existing infrastructure of the higher educational system does not foster an active learning pedagogy and should be redesigned to reflect the student focused education. By establishing a sense of community and creating an environment for collaboration, it is possible to give students more robust learning opportunities. A new, aggressive model can supplant contemporary thinking and allow for further diversity in higher education institutions.

The endurance and versatility of a new active learning pedagogy will influence and shape the fate of higher education. The degree of this change will be dependent upon the policy and practice that each institution implements. This requires a full assessment of traditional teaching models and a further review of the advantages of an active learning environment. Through this understanding, the benefits of a constructionist atmosphere will become evident and help us to identify problems with the classical teaching environment that is so heavily utilized in higher education. Architecture can become a vehicle that supports planning for future generations and emerging technologies that will further enhance and support the active learning experience.

Active Learning

Although easily understood, active learning can have a broad definition. David Weltman of the University of Texas best describes active learning as a method of learning in which students are actively or experientially involved in the learning process and where there are different levels of active learning, depending on student involvement. (Weltman, 2007) Most active learning models emphasize a hands-on approach which forces students to be...
more active in their education. Educators become facilitators in this pedagogy while students maintain a higher level of responsibility. Many confuse this specific pedagogy with similar ones, including problem based learning. As defined by Michael Prince in his ‘Active Learning’ research study, ‘Problem Based Learning’ is an instructional method where relevant problems are introduced at the beginning of the instruction cycle and used to provide the context and motivation for the learning that follows. (Prince, 2004)

Generally, higher institutions today rely upon a passive educational system. Students are required to take little responsibility in their education with much of the emphasis placed upon memorization of facts (Grabinger & Dunlap, 1993). Lecture halls encourage an environment in which the professor exposit information in the hopes that students will absorb the content. Colleges still employ this method of educational delivery that originated in Western England since the mid-16th century. An expository form of learning has been inefficient at changing behavioral skills and is not sufficient at promoting thought. McKeachie and Svinicki believe that lecturing is best used for providing updated material, adapting content to a specific group, and modeling expert thinking (McKeachie & Svinicki, 2013).

In current building models, the lecture hall has taken the responsibility and roles of many of the zones of academia. The lecture hall has been laden with being an educational delivery method, a gathering space for impromptu social gatherings, and finally a repository for exam taking. Although not initially conceived to host a wide variety of activities, lecture halls do have the ability to allow users to redefine the space to their immediate needs. For example, maker spaces enable collaboration, but they are not particularly successful to fostering a proper concentration zone for test taking. Movable furniture and rearrange-able spaces can alleviate this problem. Even two decades ago the importance of flexible classrooms was noted by Kathryn Conway when she found that “a flexible classroom environment that consists of a variety of ways to present information promotes interchanges among the teacher, students, and information.” (Conway, 1993)

An active learning approach to higher education has been shown to increase student performance. With an emphasis on student interaction, active learning allows students a more in-depth experience when compared to the traditional expository education style. The University of Washington documented the results of experiments that recorded student performance in courses with at least some active learning versus courses that relied solely upon traditional lecturing. Through a meta-analysis of 225 studies in the published and unpublished literature, their findings concluded that students in traditional lecture courses are 1.5 times more likely to fail than students in courses with active learning (Hines, 2014). Average failure rates were 21.8% within active learning environments and 33.8% in traditional lecturing (Hines, 2014).

The built environment helps to further this process by providing the appropriate qualities to enhance student engagement. In a study conducted by the National Training Laboratories, it was discovered that about 5 percent of content was retained through lecture. Furthermore, their findings concluded that 50 percent of knowledge could be retained through group discussion and 70 percent was retained using hands-on practices. The highest of these retention results was achieved through the means of an active learning model that allowed students to retain 80 percent of the content (National Training Laboratories Institute for Applied Behavioral Science, 2005). Using these findings, it is evident that active learning not only improves test scores, but also retention rates.

**Pedagogies and Technological Aid**

Technology has always played an ever-present role in the way we function. Supplanting education with innovative technology has reshaped curricula and bridged gaps in learning. The new trends of technology have already begun to cement themselves in the classroom as more schools adopt computer programs and push for computer technology classes. This aspect of education, has become increasingly more prominent and will force designers to imagine the classroom space in a whole new light. In conjunction with this new technology there has been a need for new pedagogies to accommodate such change. Virtual Reality has the potential to alter the way we look at education by connecting directly to students with a predilection for visual learning. Boise State University has found an implementation for virtual reality in its nursing program to augment the experience of students. BSU has recognized
that “a major benefit to using the virtual reality technology is the cost. The simulation technology costs around $5,000 and new simulations can be created in just four to six months, compared to manikins that cost $15-64,000 apiece. BSU is now seeking funding to develop a variety of new games and multiplayer simulations. (Morgan, 2016)” Technology must also force designers to think about the virtual classroom and what programming elements that may change in the early stages of design. No longer will large computer labs be a requirement of schools and this will allow universities to become more flexible with their space planning needs.

The classroom to has become more effective with the introduction of informational technology. Its role in education is strictly supportive, but it can aide students in a more personally tailored experience. Video games currently share this distinct aspect that allows the working frameworks of the technology to the user’s needs or preferences. Gamification is a generally new term that helps to define an educational model that allows students to compete against each other and addresses a compelling need to keep students engaged. It creates a game-like atmosphere that can stimulate learning. Video games can help support active learning by providing students a simulated environment that forces players to discover varying ways to overcome obstacles. This system of play allows the player to identify what implicit rules the game may have as well as how to succeed at overcoming them. James Paul Gee helps to characterize the ability of video games to “encourage players to explore thoroughly before moving on too fast, to think laterally and not just linearly, and to use such exploration and lateral thinking to reconceive one’s goals from time to time.” (Gee, 2005)

Professors have often relied upon the classical form of lecture-based teaching which allows the professor the ability to spread content verbally to a large crowd of students. Newer pedagogies have since arrived and they allow for the student to take a more active role in their education while allowing the educator to become a facilitator. These new pedagogies often cater to different ways of thinking and thus, the traditional lecture hall as we know it will soon be a relic of the past. Maker spaces have already begun to spring up and they allow for students to become more collaborative in their studies. By experimenting with the spatial planning of the built environment and closely assessing the new pedagogies that will be utilized, designers can help create new models that will allow for a more efficient and effective learning environment.

Academic Zones of Learning

An active learning environment is dependent upon the formation of different academic zones. Urie Bronfenbrenner has developed a concept that helps to clarify this argument. In his theory, he describes immediate settings such as the classroom being a microsystem for students and he considered the other concurrent settings to be mesosystems. (Bronfenbrenner, 1977) He understood that there is a divide in the academia of student life and the social aspects of student life. However, these systems are entirely different entities, Bronfenbrenner acknowledged the interdependent nature of these frameworks. This organization can apply not only to the campus structure of education, but also to the way interaction is handled within the buildings of the campus(Bronfenbrenner, 1977). Further recognition was attributed to the spaces between these systems to act as a buffer or transition. Among the frameworks that help demonstrate a successful learning environment, the most over-looked is the social responsibilities of higher education. The atmosphere created by the physical characteristics of a typical college campus allow for many social opportunities. These can be spontaneous meetings, networking, or brainstorming. The diversity of students helps to broaden views and opinions that influence the students themselves. Social aspects allow the students to understand the value of teamwork and develop leadership skills. For many, the college experience can also help to inform the individual of who they are and who they will become. Bronfenbrenner considers this to be a mesosystem that helps to reinforce learning, collaboration and competition in education(Bronfenbrenner, 1977). It is important to establish these spaces and allow students to engage in not only their education, but each other.

In order to fit the various systems together in a built environment, special attention should be paid to the transition spaces between these zones. Creating a distinct conversion among the social and technical zones that encompass active learning pedagogies can be difficult. By allowing living spaces and learning spaces to
be separate, students are able to reinforce their physical understanding between work and play. However, active learning pedagogies are predicated upon collaboration between students and this should be allowed to happen in a wide variety of locations throughout campus. This can become a grey area that attempts to satisfy segregated spaces while also allowing collaboration to be an integrated event. The exoskeleton of a new active learning based environment should reinforce an atmosphere of exploration and a climate that the students can put their trust into.

Current trends of the educational model have begun to show age and lose potency. The working conditions generated for the employees of Twitter and Google respectively treat the employees to a more diverse environment. Cornell College reports that students spend, on average, an additional 4-6 hours outside of class each day to study (Cornell College, 2015). This means that there could a single student might end up spending up to 42 hours a week studying in the library. Because of the physical and physiological stress this can appropriate on students, designers should be encouraged to create a more comfortable environment. For example, Google offices have always showcased this playful atmosphere. The Pittsburgh Google office is equipped with a hanging cargo net hammock and many other quirky design elements to make it feel less threatening. Furthermore, the ability to control one’s own lighting and environmental temperature can lead to employees feeling more valued, and thus, they work harder. Schools are beginning to shadow the business world more closely, with students spending increasingly more time working on assignments. This added time in the work environment should encourage employers and educators alike to make the work environment more inviting and comfortable.

Active Learning and Active Space

In order to make a more comfortable environment, designers should remember the importance of nature. Connecting the indoors with the outside world and allowing the environments access to the rich, natural lighting to illuminate rooms is important for student success. Interior plantings have also been known to stimulate the learning environment that again allows for student creativity and independence. Outside spaces for leisure or break can also be imperative for busy students who have a lot on their plates. Designers should be encouraged to create prototype spaces that can allow for education in a more outdoor atmosphere. Changing the habits of students through flexible outdoor spaces allows their brains to think differently which could engage a wider range of learning styles. In a study published in the journal Environmental Psychology, the University of Melbourne’s Kate Lee and a group of colleagues found that interrupting a tedious, attention-demanding task with a 40-second “microbreak” improved focus as well as subsequent performance on the task (Lee, 2015). The “microbreak” involved spending the aforementioned 40 seconds looking at an image of a green roof (Lee, 2015). Its an unquantifiable phenomenon that helps to break up the utilitarian aspects of the built environment.

Active learning can help to fix current issues within contemporary education. Traditional methods of education cannot produce specific, contextualized insights that promote a more effective understanding. There is a loss in transmission from applying the classic teaching practices into tangible problems. Students today seem to have base knowledge in problem solving, but the application of this knowledge isn’t prevalent in typical educational models. Students discover knowledge by reading and deciphering data in current educational frameworks. These means of delivery are still relevant, although they lack the focused context that active learning encourages. This is not to say that knowledge of theories and concepts should be forgotten, but reconfigured to fit into a more collaborative realm of thought. Contemporary classrooms lack a deeper collaboration that helps to reinforce cognitive reasoning that ensures effective learning. Currently students have a strong incentive to memorize content and focus on tests. Active learning can help facilitate this paradigm shift by providing a new built environment to emphasize this change.

The opponents of active learning pedagogies have often criticized a lack of research based education. In a maker space, progress is constantly revolving around a problem and students work to the completion of the problem, while defining what the solution will be. This type of education does not focus on traditional research projects. However, active learning can be developed to accommodate a research component. The curricula can exist outside the realm of a maker space, although that is where is has been found to be most effective. Active learning principles have been used to define research problems by
searching information, developing new information, and interpreting
the information in a reflective manner. Traditional education does focus
more effectively on individual effort rather than group problems, but that
doesn’t mean that active learning, by definition, is incapable of adapting
to such change. There are many traditional methods of teaching that are
ineffective, but there are elements that can be reformed to give students a
more comprehensive education.

Education is based upon discovery and invention. These learned
experiences work best when being translated into not only a new
pedagogy, but a built environment that enhances this pedagogy. Creating
space for students to experiment and collaborate together solidifies
learned experience in a more efficient manner than that of contemporary
methods. This allows higher institutions to coexist along a changing
workplace that demands critical and analytical thinking skills. Traditional
education has not failed us, it simply hasn’t asked enough questions.

Urie Bronfenbrenner develops his theory of frameworks regarding the layout of higher institution campuses. He goes into further depth to recognize the relationships between person and environment. He goes into further detail to break down these systems into three categories: mesosystems, microsystems, and macrosystems. Bronfenbrenner recognizes that humans are influenced by the changing environments in which they inhabit. These environments can be both formal and informal and are inclusive to a larger social context.


In her effort to reconfigure an existing classroom at the University of North Carolina, Kathryn Conway discusses the importance of technology in the classroom. She makes considerations to influence interactivity in the classroom through the use of flexible spaces. Special attention is given to the fine details of informational technology implementation and the implications that has on the classroom space.


Cornell College published an article on their website that helps incoming freshman understand what to expect from collegiate study habits. It gives prospective freshman helpful hints to empower them with time management skills that are an important aspect of the “college experience.” This article helps give a basis of time allocated to studying that remains an excellent starting point for undergraduate students.


In his seminal paper regarding video games and their educational properties, James Paul Gee discusses why the two can be seen as correlative. Gee defines the aspects of video games that make them meaningful simulations. He goes into further depth regarding situated meaning, interaction, and agency. He exposit many examples of specific video games that recreate these conditions that he believes could influence “better learning.”
R. Scott Grabinger and Joanna Dunlap of the University of Colorado formulate an indepth look into active pedagogy definitions and implementations. The article focuses on specifics of creating contextualized learning environments for constituting educational content. They propose methods for students to process complex knowledge structures and support them in real-world problem solving situations. This includes theoretical framework and constructivism within active learning pedagogies.

In a study published by The University of Washington, researchers find empirical data that leads them to believe that lecture-based education is much less efficient than active learning. Their data findings make it evident that the fail rates of students in traditional lecture based education is higher than students within an active learning environment. The conclusions of the study were then published in an article by the UW Today in a more easily digestible format for the students’ consumption.

An analysis of microbreaks that specifically focuses on biophilic proclivities of mental breaks. The article is informative of student experience within high-stress environments and methods of coping. It goes into further dissection of factors that might contribute to poor learning environments, such as stress and ineffective design.

This book, written by Wilbert McKreachie and Marilla Svinicki, is an in-depth analysis of teaching pedagogy. The book highlights many aspects of classical teaching methods and further illuminates the shortcomings of those teaching methods. Active learning is also given a further analysis by the authors and they discuss revelations they have made by implementing the pedagogy in a real-world environment. The was published by Cengage learning as a guide for educators to better understand their own capabilities to facilitate learning in a variety of circumstances.

Christina Morgan sheds light on a new virtual reality program that Boise University utilizes in their nursing program. This program allows students a new hands-on experience at a fraction of the cost of testing mannequins. Educators believe that this unique experience will give their nursing program an edge when it comes to pre-hospital training. By using a Oculus Rift and some custom hardware, the students are able to interact with virtual bodies.

The National Training Laboratories Institute for Applied Behavioral Science conducted research into retention rates among undergraduate students. Their findings concluded that students who were involved in traditional lecture courses had a lower retention rate than those who were enrolled in active learning courses. This type of research further exemplifies the strengths of active learning pedagogies and showcases that experiential learning makes a difference.


Bucknell University Professor Michael Prince discusses his discoveries regarding his active learning research. Through his paper he defines his primary differences among a variety of learning types. Through his analysis, he gives a clearer distinction between active learning and problem based learning. His research further delves into context specific problems and it is more easily retained by students. Problem based learning allows students to be more creative and utilize problem solving skills when computing realistic problems.


David Weltman's comparison of traditional and Active Learning methods provides the framework for which much of this paper is based. In his own findings, he goes on to theorize the shortcomings of the lecture format by understanding that lectures do not allow students the opportunity to take responsibility of their own education. He discerns that lecture based courses force students to focus more on fact memorization rather than actually applying learned content to new situations.
A close examination of existing higher education assemblies begins to reflect where the educational system has been and better predict where its heading. There is much to learn from what has come before and it’s important to document and compare these qualities against each other.
University of Arkansas
Champions Hall

PROJECT SIZE
67,277 Sq. Ft.

PROJECT COMPLETION DATE
2015

PROJECT ARCHITECT
SmithGroupJJR

PROJECT LOCATION
Fayetteville, AR

PROJECT DESCRIPTION

This project serves predominately as a classrooms and laboratory space while also fulfilling a need for an interactive hub and student destination. A large portion of the building is largely devoted to undergraduate classes for Math and Science. By combining these curricula, the students are enabled to connect to their faculty and peers at the onset of their education. This environment the encourages student collaboration.

This perspective showcases the context that the project exists in. The outdoor patio space allows for a more diverse student interaction.
This first floor plan highlights the topography that the building rests upon. The building arranges itself in a modular fashion so that it may develop a relationship of classroom pods. These pods are allowed to connect among each other to spark collaboration. The connecting hallway borders the edge to provide views as well as keep the class portions connected. The laboratory space is given dominance over the western half of the building to provide a connection among the classrooms. Support spaces hug the exterior walls with a few of these adjacent spaces capable to provide flexible space needs for the future of the building.

The fourth floor plan offers more separation between the spaces and allows the classrooms to inhibit more distinct characteristics. The slight angle of the overall building forces these rooms to become a bit more dynamic while maintaining overall modularity throughout the floor. A central corridor provides access throughout the classrooms and there are multiple lounge spaces to provide respite from studies or provide a soft collaboration space. The lab is position in the north to capture the northern sunlight that is ideal for such a space. In conclusion, this floor defines the class spaces in a more traditional manner to allow for a variety of different space throughout the building.
The University of Arkansas Champion’s Hall is an insightful example on how to plan classroom separation. The building offers many different configurations that allow educators more flexibility within their teaching methods while providing students with meaningful spaces that students can use to collaborate or hold social conversations in. The key strength of this building lies in the way collaboration zones are presented. The academic spaces are able to press into each other and therefore form a strong connection that can support an active learning pedagogy in a variety of ways. These spaces will offer educators the flexibility to provide contextualized learning to students in a spontaneous way.
Westfield State New University Hall

PROJECT SIZE
89,000 Sq. Ft.

PROJECT COMPLETION DATE
2013

PROJECT ARCHITECT
ADD Inc.

PROJECT LOCATION
Westfield, MA

PROJECT DESCRIPTION
This project seeks to cement itself in the landscape by establishing its own unique sense of place. This student hall emulates a unique visual connection to the surrounding landscape. ADD Inc provides a wide array of units with a variety of common spaces to foster a social aspect to student life. The project utilizes recycled, local materials in the design and sought its LEED silver certification.
The floor plan of this building showcases the many mixed use spaces that have given it a broader appeal among students. The diversity of spaces creates an atmosphere that is conductive of human interaction. The central corridor ebbs and flows in this design and leads users in a linear fashion that has twists and turns throughout it. Most evident, is the attention to detail when it comes to the surrounding landscape.

A strong discipline to the site characteristics becomes apparent in the materials and structural systems of the building. Aspects of this plan place columns in a fashion that mirrors that of the nearby forest. The student housing coexists within this building and provides students a diverse amount of spaces. Students have access to a small weight room and many terrace views to the incredible site attributes.
By taking advantage the natural features hosted by the site, the project has come to offer a wide variety of views that put an emphasis on nature. A large plaza expands this “walk among the forest,” by acting as a buffer between the built environment and the organic one. This building is exemplary way to build with an environment. Connecting students to natural elements is important in enriching their lives by providing them with elements that are unique to the site and reaffirm a sense of place. This type of architecture is perfect for creating quality spaces of respite in the life of a stressful student. To reinforce these qualities strict adherence to local material palette should be maintained.
Case Western Reserve University, Tinkham Veal University Center

PROJECT SIZE
67,277 Sq. Ft.

PROJECT COMPLETION DATE
2014

PROJECT ARCHITECT
Perkins+Will

PROJECT LOCATION
Cleveland, OH

From this vantage point, its easy to see the building connection.

PROJECT DESCRIPTION
Situated on the center of three separate zones of the Case Western Reserve Campus, this project utilizes its three wings to converge students and tie the campus together. Folded plate green roofs aid the structural system while allowing a generous amount of glazing take advantage of the site attributes.

This enterance showcases the double envelope skin that was used.
As pictured on the left, this project had the unique challenge of connecting three separate zones of the campus. The built form conforms to this task and develops distinct entrances. The double skinned envelope adheres to the southern side to minimize the thermal gains. Mixed use spaces occupy the ground floor of the building to reinforce this conjunction of spaces.
CONCLUSIONS

To accommodate the connection needs of the campus, this building aids in providing a transition to the separate zones of campus. Mixed use space that has to satisfy a diversity of needs for the campus. This project is an example of not only infill, but connecting the campus together through the built environment. It also exemplifies a need for sustainable design through the utilization of green roofs and double envelope skin.
Creating space in a project is dependent upon the amount of people who will be accessing that space. A basic list of determinants can help to begin forming the sizes of spaces. The type of room and the amount of expected people per room will vary the size of each room and, therefore, the size of the overall building.
## Qualitative Analysis

The classroom spaces in this project are generally larger than that of other typical classroom spaces. Currently, the active learning spaces utilize 35 sf/seat. Overall, the building will be able to house 175 students at maximum capacity. This is about 17% of the total 1,039 student population of WSC. For comparison, the adjacent student housing building houses approximately 250 students at maximum capacity.

The most important design elements of the program are the educational spaces, but attention should equally be given to the lounge spaces.

---

### Table: Space Utilization

#### Educational Spaces

<table>
<thead>
<tr>
<th>Function</th>
<th>People</th>
<th>Capacity</th>
<th>No. of Units</th>
<th>Area/Unit</th>
<th>Net Area</th>
<th>Net Area Subtotal</th>
<th>Gross Area</th>
<th>Net Gross</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms (SMALL)</td>
<td>12</td>
<td>3</td>
<td>420 sf</td>
<td>1,260 sf</td>
<td>2,100 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classrooms (MEDIUM)</td>
<td>25</td>
<td>2</td>
<td>875 sf</td>
<td>1,750 sf</td>
<td>2,917 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classrooms (LARGE)</td>
<td>40</td>
<td>1</td>
<td>1,400 sf</td>
<td>1,400 sf</td>
<td>2,154 sf</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexible Classrooms</td>
<td>30</td>
<td>1</td>
<td>1,050 sf</td>
<td>1,050 sf</td>
<td>1,810 sf</td>
<td>0.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exam Rooms</td>
<td>30</td>
<td>1</td>
<td>750 sf</td>
<td>750 sf</td>
<td>1,250 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactive Classrooms</td>
<td>30</td>
<td>1</td>
<td>1,400 sf</td>
<td>1,400 sf</td>
<td>2,414 sf</td>
<td>0.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>167</strong></td>
<td></td>
<td></td>
<td><strong>7,610 sf</strong></td>
<td><strong>12,645 sf</strong></td>
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<td></td>
</tr>
</tbody>
</table>

#### Administrative Spaces

<table>
<thead>
<tr>
<th>Function</th>
<th>People</th>
<th>Capacity</th>
<th>No. of Units</th>
<th>Area/Unit</th>
<th>Net Area</th>
<th>Net Area Subtotal</th>
<th>Gross Area</th>
<th>Net Gross</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reception/ Help Desk</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>64 sf</td>
<td>64 sf</td>
<td>107 sf</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Large Conference Room</td>
<td>15</td>
<td>1</td>
<td>300 sf</td>
<td>300 sf</td>
<td>500 sf</td>
<td>500 sf</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Small Conference Room</td>
<td>6</td>
<td>2</td>
<td>175 sf</td>
<td>300 sf</td>
<td>500 sf</td>
<td>500 sf</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Copy/ Workroom</td>
<td>1</td>
<td>1</td>
<td>100 sf</td>
<td>100 sf</td>
<td>143 sf</td>
<td>143 sf</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Staff Offices</td>
<td>8</td>
<td>8</td>
<td>1</td>
<td>144 sf</td>
<td>215 sf</td>
<td>215 sf</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>9</strong></td>
<td></td>
<td><strong>30</strong></td>
<td><strong>908 sf</strong></td>
<td><strong>1,465 sf</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Core Activity Spaces

<table>
<thead>
<tr>
<th>Function</th>
<th>People</th>
<th>Capacity</th>
<th>No. of Units</th>
<th>Area/Unit</th>
<th>Net Area</th>
<th>Net Area Subtotal</th>
<th>Gross Area</th>
<th>Net Gross</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maker Space</td>
<td>48</td>
<td>1</td>
<td>1,920 sf</td>
<td>1,920 sf</td>
<td>3,200 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display Space</td>
<td>25</td>
<td>1</td>
<td>750 sf</td>
<td>750 sf</td>
<td>1,250 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admin Lounge</td>
<td>12</td>
<td>1</td>
<td>250 sf</td>
<td>250 sf</td>
<td>403 sf</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Lounges</td>
<td>20</td>
<td>2</td>
<td>500 sf</td>
<td>1,000 sf</td>
<td>1,667 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reception Lobby</td>
<td>15</td>
<td>1</td>
<td>225 sf</td>
<td>225 sf</td>
<td>369 sf</td>
<td>0.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>120</strong></td>
<td></td>
<td></td>
<td><strong>4,145 sf</strong></td>
<td><strong>6,889 sf</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Support Spaces

<table>
<thead>
<tr>
<th>Function</th>
<th>People</th>
<th>Capacity</th>
<th>No. of Units</th>
<th>Area/Unit</th>
<th>Net Area</th>
<th>Net Area Subtotal</th>
<th>Gross Area</th>
<th>Net Gross</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corridors</td>
<td>2</td>
<td></td>
<td>40 sf</td>
<td>80 sf</td>
<td>80 sf</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevators</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mech Space</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men's Restroom</td>
<td>4</td>
<td>3</td>
<td>144 sf</td>
<td>432 sf</td>
<td>720 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women's Restroom</td>
<td>4</td>
<td>3</td>
<td>144 sf</td>
<td>432 sf</td>
<td>720 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admin Restroom</td>
<td>1</td>
<td>1</td>
<td>80 sf</td>
<td>133 sf</td>
<td>133 sf</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Janitor Rooms</td>
<td>4</td>
<td>50 sf</td>
<td></td>
<td>200 sf</td>
<td>227 sf</td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Rooms</td>
<td>4</td>
<td>150 sf</td>
<td></td>
<td>600 sf</td>
<td>706 sf</td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>9</strong></td>
<td></td>
<td></td>
<td><strong>944 sf</strong></td>
<td><strong>2,506 sf</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Land Use Area**

<table>
<thead>
<tr>
<th>PHASE I</th>
<th>People</th>
<th>Gross Building Area</th>
<th>Floors</th>
<th>Building Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>200</td>
<td>23505 sf</td>
<td>3</td>
<td>12,862</td>
</tr>
</tbody>
</table>
FUNCTION

In order to better accommodate the academic needs of the current and future students of Williston State College, there is a need for a building that encourages active learning pedagogies. The building should embody a design that is conducive of interactivity and collaboration found in an active learning pedagogy.

Because technology is a powerful tool that strongly aids the active learning process, attention should be given to the design of spaces that will heavily rely upon it.

The student experience is one that helps to further reinforce student discussion and teamwork. In an effort to fulfill this need, the building should encompass a design that allows students to use it during all parts of the day in ways that will suit their academic needs.

FORM

Williston State College is in the process of reimagining their campus through a dramatic new master plan. As such, the college would like to define its own identity by creating a building that is state-of-the-art and respectful to the surrounding landscape. This project’s goal will be to interpret the relationship of the built environment and central plaza of the campus.

The project will have to conform to the preexisting campus conditions by maintaining a small footprint and the design should reflect these existing conditions.

ECONOMY

While the oil boom in Williston has slowed down, it is important to understand that oil has driven much of the city’s economy. Currently, the city is investing into its own infrastructure and amenities to prepare for another potential boom. As such, the budgetary constraints of this project should not be extravagant, but yet also be flexible enough to accommodate a potential population influx.

Future use costs of the building can be mitigated through a strategic implementation of active systems throughout the building. These systems will not only save money longterm, but will also help to showcase the technological achievement the building hopes to project. Therefore, the project budget should be lavish enough to include the active systems that will power the building.

TIME

Due to increasing technological advancements in education, it is imperative that the design remain flexible for future implementation. This building should have the ability to be adaptive in ways that encourage student interaction and collaboration. Technology will only remain state-of-the-art for a limited time, so it is important to allow for the convenient replacement of integrated systems throughout the building.
PROJECT PROGRAM
WILLISTON STATE COLLEGE ACTIVE LEARNING BUILDING

EDUCATIONAL

CORE ACTIVITY SPACES

ADMINISTRATIVE

SUPPORT SPACES
EDUCATIONAL: 7,610 sq. ft
CORE ACTIVITY SPACES: 4,145 sq. ft
ADMINISTRATIVE: 908 sq. ft
SUPPORT SPACES: 944 sq. ft
PROJECT PROGRAM
WILLISTON STATE COLLEGE ACTIVE LEARNING BUILDING

TOTAL VOLUMETRIC AREA
68,490 CUBIC FT

TOTAL VOLUMETRIC AREA
37,305 CUBIC FT

TOTAL VOLUMETRIC AREA
8,172 CUBIC FT

TOTAL VOLUMETRIC AREA
8,496 CUBIC FT
Architecture exists within context and is shaped by its setting. The site features will help inspire the design direction as well as reveal the passive strategies that are available. This analysis lends itself to discoveries of the culture, climate, and geography of the immediate vicinity. Both qualitative and quantitative elements will aid in the design.
WILLISTON DEMOGRAPHICS

POPULATION: 20,850 (2013)

MEDIAN HOUSEHOLD INCOME (2014) $83,750

CONCLUSIONS

The conclusions that I can make from demographics will help influence basic programming elements of my design. I can get a better understanding of how big to make spaces based off population, as well as understand the level of security that will be necessary due to the criminal rate.
WILLISTON CLIMATE DATA

AVERAGE HIGH TEMPERATURE
54.1°F

AVERAGE LOW TEMPERATURE
28.8°F

AVERAGE ANNUAL PRECIPITATION
14.41 inch
CONCLUSIONS

Through critical analysis of the climate data, it is easy to see how small natural elements will shape the design. The wind rose can aid design by utilizing the prevailing winds for cooling and understanding how to best shield the winter winds. The previous page details average temperatures so that design can accommodate for the cold and hot months of the year effectively. For example, it is now obvious to conclude that the months of July and August are the hottest months of the year and those months will demand the most from my cooling systems.
WILLISTON

FIGURE

GROUND

TRAFFIC

VEHICLE TRAFFIC

PEDESTRIAN PATH

WATER
WILLISTON
FIGURE
GROUND
SUN AND WIND
DIAGRAM
1. **STEVENS HALL**
Classrooms, Learning Commons (library) student services, Teton Grill, Andrea's (bookstore), Skadeland gymnasium, Teton Lounge, student life office and administrative, staff and faculty offices.

1a. **SCIENCE CENTER**
Labs and faculty offices for biology, anatomy, physics, chemistry.

1b. **LEONARD P. NELSON HEALTH & WELLNESS WING**
Health, physical education, nursing and massage therapy programs.

1c. **THOMAS WITT LEACH COMPLEX (THE WELL)**
2,200-seat sports arena, walking track, fitness facility, faculty and athletic offices.

2. **CRIGHTON BUILDING**
Classrooms, labs and offices for diesel technology program. Also houses Adult Education.

3. **WILLISTON AREA RECREATION CENTER**
State-of-the-art 250,000+ square foot community rec center with indoor walking/running tracks, cardio/weight lifting areas and indoor waterpark.

4. **ART WOOD BUILDING**
Classrooms and labs for automotive technology program.

5. **WESTERN STAR CAREER AND TECHNOLOGY CENTER**
Business and technology, art, welding and petroleum classrooms, labs and faculty offices. Also houses the Marketing department.

6. **PRESIDENT’S HOUSE**

7. **FRONTIER HALL (CAMPUS HOUSING)**

8. **ABRAMSON HALL (CAMPUS HOUSING)**

9. **MANGER HALL (CAMPUS HOUSING)**

10. **NELSON HALL (CAMPUS HOUSING)**

11. **WSC FOUNDATION APARTMENTS II**

12. **WSC FOUNDATION APARTMENTS I**

WSC Foundation, nonprofit agency that manages donations made by community members and alumni to the college and its students. Retail space on lower level includes: DMV, Jason's Barbershop and Jimmy Johns.

**WORKFORCE TRAINING CAMPUS (TRAINND)**
Located in the industrial park on the east side of Williston.

WORKFORCE TRAINING CENTER | 415 22ND AVE NE
PETROLEUM SAFETY & TECH CENTER | 421 22ND AVE NE
Monday-Thursday: 8a-4:30p | Friday: 8a-4p
safety.training@willistonstate.edu
willistonstate.edu/trainND | 701.572.2835
Williston State University has recently begun a drastic shift to accommodate its new master planning. As such, the lot highlighted in red is vacant for building. Much of the campus is still in its infancy with only about five buildings currently existing. My site borders university drive and will act as one of the first sights that will be visible to incoming visitors and students. This gives me a prime opportunity to help further define the characteristics of the campus.
The central plaza that shares the inside portion of the circle drive entrance is utilized as an important mixed use space. In the above photo, a breast cancer awareness relay is being held.
Looking South, the town water tower defines the edge of my site.

The front gate of WSC, located adjacent to my site. Just beyond this entry is Frontier Hall, a co-ed dormitory.

A typical classroom found within Roberts Hall.

Across the street lies the President’s house which utilizes its own unique characteristics on the landscape.
Just outside the campus is the downtown area of Williston. Pictured on the left is the J.C. Penney that exists in that downtown area. Interestingly, the exterior of the building has remained untouched for decades.

Below is a photo that describes the landscape that surrounds the city. Rolling hills with sparse tall vegetation provide a unique backdrop to the site experience.
As a protocol to be adhered to, but not bound by, the building code has served as a standard for construction throughout the world. By determining the basic design parameters that will be pertinent, the code analysis sets to lay some ground rules for the design of the project. These rules will define square footage, height, and the like.
OCCUPANCY TYPE

EDUCATION

ASSEMBLY
Assembly A1
Assembly A2

UTILITY & MISC

MAX EXIT WIDTH
50 FEET TO EGRESS
2 EGRESS DOORS

CONSTRUCTION TYPE
TYPE II B

SF PER GROUND FLOOR
A-1 34,000
A-2 38,000
E 58,000
U 34,000

EXIT

0 hr
# Occupancy Type

<table>
<thead>
<tr>
<th>Educational Classroom Area</th>
<th>20 net</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconcentrated Assembly</td>
<td>15 net</td>
</tr>
<tr>
<td>Shops and Other Vocational Room Areas</td>
<td>50 net</td>
</tr>
<tr>
<td>Kitchens</td>
<td>200 gross</td>
</tr>
<tr>
<td>Exercise Rooms</td>
<td>50 gross</td>
</tr>
<tr>
<td>Locker Rooms</td>
<td>50 gross</td>
</tr>
</tbody>
</table>

## ADA Guidelines

### Max Height
- A-1: 3 Stories
- A-2: 3 Stories
- E: 3 Stories
- U: 3 Stories

![ADA Guidelines Diagram]
PLAN FOR PROCEEDING

DEFINITIONS OF RESEARCH DIRECTION

By pairing both descriptive and evaluative research, the direction of this project will thoroughly define past pedagogies and architectural implications to better develop new ones. Descriptive research lends itself to the generalization of new facts and data formulated from past precedents. This type of research will give meaning to the active learning pedagogy and its underlying principles. Comprehensive data is then compared under an evaluative research methodology. Evaluating the qualities of the data can help to narrow conclusions and shed light on previously unseen ones. These methodologies, in conjunction, can cover the breadth pedagogies that the higher educational model has exploited. Finally, design research brings the data together holistically to test it within an iterative design process. Effectively, this direction will mirror the principles of the active pedagogy itself and allow me to define the solution that I will be working toward.

DESIGN METHODOLOGY PLAN

The descriptive research methodology will require a vast collection of information and figures until all relevant data is expunged from their sources. Specifically, I will be gathering details from a wide range of past projects, teaching pedagogies, previous studies, and like references. This will require a deeper scope of information than can be culled from a quick google search. Inherently, this information will become a template for the following evaluative design research. The evaluative research methodology compares, contrasts, and analyzes the information for relevance. Furthermore, the evaluative process, will enable me to recognize patterns and formulate generalizations based on these reoccurring patterns.
PLAN FOR RESEARCH DOCUMENTATION

Documenting this project will give myself and others a more visual understanding of the process of my work. Documentation will comprise of case studies and their related datasets. This may include a specific project in the nation and gathering information that reveals its energy efficiency, structural systems, spatial layout, and design aesthetic. These qualities will help to reveal more than the sum of their parts to the research strategy. Most importantly, the descriptive research phase will conduct interviews among students and professors to gain secondary knowledge regarding the higher education experience. The evaluative research be documented through charts and tables that combine the knowledge gained form the descriptive analysis. Particularly, the information will be put into graphs to evaluate parameters and written analysis that delves deeper into comparative measures. The iterative design process will revolve around a multitude of varying models and drawings that analyze and aspect of design by having many constants and few variables. The iterations exemplify the differences amongst each other to identify various alterations of design.
FOCUSED PROJECT SCHEDULE

SCHEDULE BREAK-DOWN

JAN

RESEARCH

CASE STUDY INVENTORY

DESCRIPTIVE SOCIAL SURVEY

COMPLEX DESCRIPTION

PARAMETER ASSESSMENT

DIAGNOSIS SUMMARY

EVALUATION AND ANALYSIS

FEB

WEEKLY SCHEDULE
REFERENCES


Compiled sets of analysis that question the performance and ultimately, the success of this thesis. Responses to site and context, typological research, and goals of the project are addressed in this section to guide the design thinking portion of the project. In short, the performance analysis defines the problems that my thesis will address.
RESPONSE TO SITE

Academic Buildings
Residential Buildings

Walking Rings

Green Space
Future Development
RESPONSE TO CONTEXT

Drawing upon common paths and geometries of the surrounding site led me to describe patterns spatially. These spatial diagrams are my interpretation to overall building footprint and are detailed on this page. Within this series, the frameworks for what the building will eventually become emerge.
RESPONSE TO TYPOLGY OR PRECEDENT

HBKU CARNEGIE MELLON - LEGORRETA + LEGORRETA

FLOOR PLAN

PATHS OF CIRCULATION

SPATIAL ANALYSIS

DEFINING GEOMETRY
EXPLORING SPACE
CLASSROOM ARRANGEMENT

TRADITIONAL GRID ARRANGEMENT

This layout is the most common and is used for a variety of teaching styles and educational settings. It creates an academic atmosphere by imposing a physical sense of discipline and frees students from immediate distractions. The grid is not adept at collaboration unless desks/chairs are moved around.

TIERED ARRANGEMENT

Tiered arrangement shares may similarities with the grid layout but places an emphasis on presentation. Generally, tier arrangement utilizes fixed seating and does not further a collaborative process. Typically this layout is found mostly in the higher education and benefits from a strong acoustic accommodation that can cater to larger student and class sizes.
A more unorthodox layout, this arrangement can be useful to divide classrooms into two separate groups. It places an emphasis on the instructor by giving them a larger teaching “stage” within the room. It forces the instructor to be more dynamic and move to elaborate teaching points to both halves of the classroom. It can cause more distractions for students due to the each side facing the other side, but it can eliminate back row students.

Combining the strengths of different arrangements, this layout creates a more casual atmosphere that is versatile enough for many different teaching methods. Chained layouts can vary slightly to cater to presentation, collaboration, class grouping, and discipline. However, this layout doesn’t necessarily do any of these things perfectly.
In a similar fashion to the runway arrangement, the clustered layout fosters groups among the classroom and encourages collaboration. This layout can limit visibility for select students in awkward areas of the room. Some students will only need to slightly turn their head while others will have to face the opposite direction. Some students could become distracted within small groups respectively.

The clustered radial arrangement combines the qualities of the cluster and tiered arrangements. By focusing the small clusters around the presenter, the learning environment can be more conducive to visual learners while still advocating collaboration. Along with cluster arrangements, variations can manifest to cater the room to the educator’s teaching styles.
The adoption of a horseshoe arrangement has strong advantages among group discussion. This encourages collaboration, but not hands-on collaboration. This type of layout gives emphasis to the students since they will drive the content of the class period. Typically, this arrangement only exists in specific contexts.

A hybrid arrangement that gives importance to the tools of the classroom rather than the instructor, the media center arrangement works similarly to the cluster arrangement. However, this arrangement encourages small groups to remain isolated from other small groups in an effort to connect students to technology. This arrangement is also difficult to reconfigure within the classroom.
Montessori arrangement does not confine itself to specific arrangement. It may combine elements from various classroom arrangements, but it uses these elements in instances throughout the classroom. This makes for a very diverse learning environment that can be chaotic, but feels open to students for interpretation. Traditionally, this type of layout is found within an elementary school context.

By eliminating the number of students who can participate, it places importance on the ones who sit around the table. The most intimate of arrangements, the board room layout treats students as individuals and allows everyone to work as one cohesive unit. Although larger tables limit the interaction between all students, this type of collaboration recreates the freedom that one might find at the family dinner table.
This layout shares many similarities with the clustered arrangement, but the specific inclusion of round tables changes the experience of the students. This has the advantage of close connection between students at each table, but limits interaction between all the tables. Furthermore, this arrangement can be the most distracting as students are seemingly encouraged to interact among each other.

Although extremely similar to the grid arrangement, the herringbone arrangement creates a unique learning environment physically. It doesn’t radiate a sense of discipline in the same way and can seem more inviting than a typical grid arrangement. This layout exemplifies the power of slight variations within the built environment.
RESPONSE TO GOALS OF PROJECT

What is active learning pedagogy?

ACTIVE LEARNING: Any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing.

Why is active learning pedagogy effective?

CONTEXTUALIZED EDUCATION
NONDESCRIPT
STUDENT INVOLVEMENT

What other aspects of education play a role in our intellectual advancement?

SOCIAL
SELF PERCEPTION
CONNECTION TO NATURE
SUMMARY OF QUANTITATIVE RESEARCH

EDUCATIONAL RETENTION PYRAMID

- 5% Lecture
- 10% Reading
- 20% Audio-Visual
- 30% Demonstration
- 50% Group Discussion
- 75% Practice
- 90% Teaching Others

STUDENT ATTENTION SPAN DURING A LECTURE IS ROUGHLY 15 MINUTES

LECTURE RETENTION:
FIRST 10 MINUTES AND LAST 10 MINUTES

70% 20%

PERCENTAGE OF STUDENTS WHO FAILED TEST COURSE

ACTIVE
22%

TRADITIONAL
34%

Average College and University Results

<table>
<thead>
<tr>
<th>Concept</th>
<th>Percentage Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force</td>
<td>0% 2% 4% 6% 8% 10%</td>
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<tr>
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</tr>
<tr>
<td>Velocity</td>
<td>0% 2% 4% 6% 8% 10%</td>
</tr>
</tbody>
</table>

After New Methods
After Traditional Instruction
Before Instruction

† Freeman, S., S. Eddy, and M. McDonough “Active Learning Increases student performance in science, engineering, and mathematics,” October 2013
* Adapted from National Training Laboratories. Bethel, Maine
Creating the first steps of the project’s eventual conclusion can be a difficult task. Recorded here in succession, are my initial reactions to typology, site, precedent analysis, and research through a design solution. An iterative progression enabled me to build onto my ideas and progress to an ultimate solution.
CONCEPTUAL FRAMEWORK

ACTIVE LEARNING PEDAGOGY

Through early schematic design, it was evident that a discipline and adherence to active learning principles would be necessary to guide the project toward an integrated outcome. Spaces were planned specifically with pedagogy in mind so that the strengths of active learning pedagogy could be realized.

ADAPTIVE/FLEXIBLE SPACES

Another important aspect that I progressed from the onset was the idea of flexible space. A brief look into scientific journals and science fiction gave me a clearer understanding of how to best integrate these types of spaces throughout the design.
PROGRESSION
This idea of mobile space began to manifest itself through diagrams which attempted to represent a notion of constants and variables. For way-finding purposes, my exploration focused on creating areas of the building in which the rooms would have the ability to shift, while the adjacent spaces remained static.
MOBILE CLASSROOMS

Evolving throughout my process, the concept of mobile spaces soon became a construct that gave rooms the ability to travel throughout designated areas. I drew inspiration from car manufacturing facilities, in which, the vehicle traveled throughout the facility as it was being constructed.
MOBILE CLASSROOMS

Again, imagining the classroom space to treat students like a work-in-progress helped me visualize classrooms that would act like industrial machines. These classrooms were limited in their motion however, and thereby, their permutations. This early concept proved to be too cumbersome for the average individual to control, but it did explore the idea of shifting space volumetrically.
Creating a system that would be simple for individuals to operate enabled me to create flexible space in a more intimate setting. Much of the inspiration was drawn from tiny dwellings and spaces that were creatively engineered to house many varying uses. I imagined these classrooms to have interior walls that could be reconfigured to alter the space inside, while the classroom itself would also be free to shift in its environment.
The assembly of these mobile wall elements provided me with the unique opportunity to design for efficiency. The wall cavities were given the consideration to include door openings and use the cavity of the door opening to become furniture such as the tables and chairs shown above.
Less exaggerated change became a simpler design solution and these classrooms were conceived to move a few times during the course of the semester. This would allow the connecting spaces such as the hallways to become less encumbered. Relating the transformation of these spaces to an individual remained a top priority.
The development of these pods led me to create a modular and therefore, permutations. It became important to understand shape sizing and performance of these classroom pods as they were to become the centerpiece of my design.
ADAPTIVE SPACE DEVELOPMENT
PROGRESSION
INITIAL FLOOR PLANS

The progression of ideas led to the creation of these initial floor plans. The overall spatial organization led me to develop the modular spaces in the center, the mixed use spaces in the front and the administrative spaces to the front corner. These floor plans react to the central plaza to create a more intimate connection between the public.
CONCEPTUAL DEVELOPMENT
Exploring form became much more poetic than that of the floorplan and these sketched became a unique way to seek a visual direction for organizing spaces. Many of them take cues from my earlier modeling attempts as well as a sense of repetition. Somehow, it seems the aesthetic seems to also be inspired by an armadillo.
These ideas translated into elevations and sections of the built form. The bottom two elevations are the most current forms of my exploration. It attempts to group spaces while maintaining that repetition and hierarchy.
Design progression eventually reaches a climax and final drawings are produced. Although all projects are left simply abandoned, rather than finished, documentation gives this project and culminating ideas an end point. Recorded is the final result of design thinking and research.
EDUCATIONAL PODS
THESIS OBJECTIVES

- Improve the way higher education teaches students.
- Propose a new teaching style that allows architects to realize a more effective learning environment.
- Implement technological advancements in a meaningful way.
- Foster a social environment for collaboration among students.
- Analyze basic concepts of educational programming and classroom design.

METHODOLOGY

Dynamic change in traditional terms, refers to the teaching method or pedagogy, that is implementable within classrooms. Classroom style and teaching methods that allow for active learning and integrated technology in the classroom will play a key role in assisting in the formation of the environment of the pedagogy. The program will allow for more opportunities to allow the architecture to embody a social dynamic for the progressive needs of the pedagogy.

CLASSROOM PODS

Active learning pedagogy is predicated upon having active flexibility. Through a more involved collaboration and a more collaborative approach. The implementation of this idea is that of classrooms that can adapt to the students. These are mobile, reconfigurable, and reconfigurable to the ability to arrange the space in which they learn. The design of these pods becomes building blocks for students to engage. These spaces provide the users autonomous control and flexibility to develop their own permutations of space that might be required.

PRECEDENT ANALYSIS

Acknowledging past experimentation in regards to spatial planning, I took the efforts of building several different precedents. Although I chose to not directly adhere to previous design strategies in educational and adaptable, this study was used informally on my own design approach.


Freeman, S., S. Eddy, and M. McDonough “Active Learning Increases Student Performance in Science Engineering, and Mathematics,” October 2013


<table>
<thead>
<tr>
<th>Studio Experience</th>
</tr>
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<tbody>
<tr>
<td><strong>ARCH 271</strong> VANDERBRUGGEN</td>
</tr>
<tr>
<td>FALL 2013 TEA HOUSE</td>
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<tr>
<td><strong>ARCH 371</strong> GLEYE</td>
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<tr>
<td>FALL 2014 FARGO VISITOR’S CENTER, DOWNTOWN MIXED USE</td>
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<tr>
<td><strong>ARCH 471</strong> FAULKNER</td>
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<td>FALL 2015 HIGHRISE</td>
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<td><strong>ARCH 771</strong> BARNHOUSE</td>
</tr>
<tr>
<td>FALL 2016 ULEN WETLANDS RESEARCH FACILITY</td>
</tr>
</tbody>
</table>
ABOUT THE AUTHOR
NATHAN D. ALMEN

SELF DESCRIPTION

Through a rigorous journey of five educational years, my personal growth and experience have humbly multiplied. Developing my thesis and exploring the passion I have for education has given me the chance to see all new possibilities as they relate to architecture. I have taken many steps since coming to North Dakota, but I never imagined that I would travel as far as I have.