Final Project
Design Journal

Group # 6

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Purdue University
Tech 120

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Our team's main focus was Virtual Reality, we all showed interest and all other Virtual Reality is a interesting topic to learn and create upon, considering how new it is. On our first in class team meeting, our team agreed just focusing on Virtual Reality was not enough to be successful. From process of elimination we all agreed to pair Virtual Reality with Urban Infrastructure. We all agreed that this would be a cool, interesting, and creative area to focus and scope in on. We looked around at existing things and found there was a lack of applications used for education. So we decided to scope in on Urban Infrastructure and Virtual Reality in the education setting.

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Problem Statement

Current Students in Engineering, Architecture and Construction need supplemental instructional tools because these students have troubles visualizing, interpreting, and scaling current designs and current design software is not enough.

Background: SThe said fields are very applied and design based studies. Spacing and visualization are crucial in the understanding of these fields because students studying those fields will be the next generation of building infrastructure. Our group has a few students in engineering technology and construction management and it is unanimous to our three group members that new tools need to be used to teach the skills needed for their studies.

List of Stakeholders/Users

College students in Engineering and Architectures
Architects
Engineers
Construction Managers/Firms

We are targeting these stakeholders for our project because they all interact in the field together. COnstruction companies and Architecture and Engineering companies work together to form structures that form modern civilization. Most of the courses taken by students studying these majors take similar or identical courses so our prototype should target the industry as a whole.

Field Work Plans

Who is doing what?
Austin- Interviews
Liam- Interviews
Alex- Interviews
Dylan- Int. and Obs.
Jacob- Obs.
Aidan- Obs.

Observations -
Envision Center- Lets us see the VR Process
Class that one of the stakeholders take a part of- So we can see how much students struggle
Engineering labs- to see how students interact with the current software

Interviews -
In person for all.
College Students in Architecture, Engineering, or Construction Management, because they are the students affected the most by our solution.
Professors who teach classes to said student because, we will get information from their thoughts of our proposed idea.
Envision Center Staff so we can get more information on VR and how it works.

Transition between problem statement and benchmarking

When we the team first came together for a group, we didn't know much about each other and what interested all of us. After getting to know each other, we discovered we had 2 interests when relating to the 14 grand engineering challenges, those were the enhancement of virtual reality and the restoration and improvement of urban infrastructure. These were going to be the main two grand challenges we were going to focus on. From there, we developed out point of view statement, our stakeholders (who our product would be geared towards), and a gantt chart showing who in the group would be in charge of certain aspects of the project. After figuring out our main challenges and other necessities, we set out to find previous solutions and ideas other companies and schools had when it came to our idea. This would be the start of our benchmarking process.

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Introduction to benchmarking

Our first task as a group was to make a benchmarking solution tab. We looked up keywords relating to our issue which at the time was virtual reality and urban infrastructure. From there it lead to finding solutions and other research that have already been researched on. Each person from the team found 3 existing solutions from articles and research papers and wrote a summary and analysis on what they found from their sources. The result was that each person in the team picked what they thought was the best solution that they found, and we based each solution on a certain set of criteria. After we found best the solutions, we set out to interview certain people from what we identified on our criteria to found out what they thought

Benchmarking Existing Solutions - (Jacob Smith)

Source 1: Statt, N. (2016, August 16). Intel's new Project Alloy is a wireless VR headset for 'merged reality'. Retrieved March 05, 2018, from https://www.theverge.com/2016/8/16/12503948/intel-project-allow-vr-headset-cordless-mixed-reality

Keywords used: Cordless vr systems

Solution 1: There are annoying cords used in VR. Now there are wireless options.

Summary: Virtual reality, also known as VR, is a relatively new product. There used to only be VR with cords. Intel has recently developed Virtual Reality without the annoyance of having cords becoming a tripping hazard for the user. Intel designed a wireless VR device that can be worn like a headset. Once the headset is placed around the users head, the person can only see inside the Virtual Reality, making everything inside seem real. Since there are no more cords, the product is much more safe to use.

Analysing my source: This is a average quality source. It is an article reviewing the wireless VR product that the company Intel released. The author is a credible writer for “The Verge”. The information is accurate because the author has no bias towards the topic and the information comes from watching a presentation of the product. The purpose of this article is to sell the wireless VR set to people. They are trying to inform all the benefits of VR and use them as selling points.

Benchmarking Existing Solutions - (Jacob Smith)

Source 2: Sumra, H. (2017, September 20). Pimax wants to solve VR's problems with the first 8k headset. Retrieved March 05, 2018 from https://www.wareable.com/vr/primax-8k-vr-headset-price-release-date-features-2414

Keywords used: how to solve vr price problem

Solution 2: Most VR headsets are way too expensive for the average person. Pimax has developed a VR set that is a third of the price of the regular product.

Summary: Virtual Reality headsets were a big hit when they were first released. Most people seemed to be intrigued by such a product. The VR headset literally puts the user into another reality. The problem is that the price is way too expensive for average americans to purchase. Most VR sets cost upwards of 1,500 dollars. That is out of the price range for most who are just intrigued by the product. Pimax is offering the solution. Pimax is a VR company that is producing VR sets that are less than 500 dollars. That brings down the price into another whole market of customers

.

Source 2 Analysis: This is an average source. It is an article written by a website that commonly does reviews of popular products. It's reader base believes it to be credible because of its valued opinions on products. The author is semi credible. She is an author for the Wareable website. There is some bias from the author. She is an opinion based writer. The purpose of the article is to give the opinion of the writer about which is the best VR company to buy from.

Benchmarking Existing Solutions - (Jacob Smith)

Source 3: Karner, J. (2017, February 13). How to deal with severe battery drain through your Gear VR. Retrieved March 05, 2018 from https://www.vrheads.com/how-deal-gear-vr-causing-severe-battery-drain

Keywords used: how to solve battery life with vr

Solution 3: VR sets that require the use of a phone do not always have the best battery life. Oculus has uploaded an update that extends the use of battery life during the use of VR with a phone.

Summary: Most people who buy VR sets that work with their phones are not buying the top of the line product. A big issue is when the phone is used with the VR set, the battery is drained too quickly. Some users have full battery life and can only use the VR set for about an hour. When using the Oculus set, they have developed an update that saves battery life for user's phones. It makes the battery operate much more efficiently while being used for Virtual Reality.

Source 3 Analysis: This is an average source. It is an article written on an informative website about issues that people commonly search for. The author is credible because she has conducted research about the issue and found a solution. She does not appear to have any bias towards the topic. The purpose of the article is to inform about the issue of battery life with phones while being used for VR.

Benchmarking Existing Solutions - (Alex Rasmussen)

Key words: Architecture VR software

Solutions:
A software that lets you view models of buildings in VR.

One paragraph description of the solution:
A company named Iris made a software that is supported by VR to be used in architecture. Their software is designed for presentations, collaborative sessions, and design reviews. It has the viewer walk through and see the building in VR to get a sense of scale and design flow. The models come from Sketchup, Revit, Rhino, and FBX, the software needs windows to set it up, and the users uses the HTC Vive or Oculus Rift to move/view the environment.

Link to source:
https://irisvr.com/

Reflection

Currency: It costs $50 per month.
Relevancy: VR is a new thing and is on the rise.
Authority: It was test by multiple companies and featured on multiple shows
Accuracy: ???
Purpose: It can be used to help pre-plan building project.

Benchmarking Existing Solutions - (Alex Rasmussen)

Key words: VR Infrastructure

Solutions:
VR models of already built buildings.

One paragraph description of the solution:
People uses these models to inspire their designs and see how other buildings function. This site helps solve the problem of needing to see buildings but needing to stay in one spot. They also use VR to help plan new buildings.

Link to source:
http://www.vrinfraventures.com/

Reflection

Currency: I think it's free.
Relevancy: It's pretty relevant because VR is becoming more popular.
Authority: VR Associates has people with 25 years of experience in architecture.
Accuracy: ???
Purpose: To see how multiple buildings are designed in your own home.

Benchmarking Existing Solutions - (Alex Rasmussen)

Key words: VR buildings

Solutions:
It helps architects show off their portfolios.

One paragraph description of the solution (3-4 sentences):
In architecture classes, students will most likely make their own building models and then show them off to companies to be hired. With a VR portfolio, the architect will stand out more than the others. The software supports models on 3ds Max, Sketchup and Revit.

Link to source:
https://www.archdaily.com/888524/how-to-create-an-architecture-portfolio-in-virtual-reality

Reflection

Currency: Unknown
Relevancy: VR is a new thing and is on the rise.
Authority: A company called Sentio
Accuracy: ???
Purpose: It helps architects get jobs by having better things on their portfolios .

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Benchmarking Existing Solutions - (Dylan Zamsky)

Keywords: Virtual Reality, infrastructure, design programs

Solutions:

The technological solution include super-computational modeling and structural simulations, window glass fragmentation modeling, risk management procedures, instrumentation and health monitoring systems, and three-dimensional CAD virtual reality visualization techniques.

One paragraph description of the solution:

This paper describes the necessities of virtual reality in the construction and design world. The effect of testing designs with in a virtual world will limit risk and save money if design changes are made in a timely manner. This program is already being used at the University of Mexico for teaching purposes but the applications go beyond the classroom. Their is a strong application to architectural firms, A & E companies and even construction companies. This program can even simulate glass fragmentation and CAD VR visualization techniques.

Link to source:

Matalucci, R.V., & Miyoshi, D.S. *An introduction to the architectural surety program*. United States.

Reflection

Currency: unknow price; but is very expensive
Relevancy: VR is a safe environment to test structures
Authority: Currently being used by reputable universities
Accuracy: published as a professional document
Purpose: It can be used to save money and to limit hazards on the job sites.

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Benchmarking Existing Solutions - (Dylan Zamsky)

Keywords: Virtual Reality, infrastructure, design programs

Solutions:
Fixes design mistakes and catches mistakes made in designs in design applications.

One paragraph description of the solution:

Using virtual reality to simulate construction project benefits engineers and construction managers because it helps present donors and owners of projects the designs in a virtual reality that helps people visualize designs in a first person view. In this article the company is using it to make a wall on the side of a hill. A 360 degree camera is used to create the VR and projects the designs into the space virtually generated through laser measuring.

Link to source:

Wilson, B. (2017). The future world around you: DOTs, design firms taking advantage of virtual reality. *Roads & Bridges*, *55*(12), 28-30.

Reflection

Currency: construction projects cost upward of 17 million
Relevancy: VR is a valuable visualization tool.
Authority: In us se by many major construction and design companies.
Accuracy: published as a professional document on Purdue Library
Purpose: To better visualize designs for accuracy and catch mistakes.

Benchmarking Existing Solutions - (Dylan Zamsky)

Keywords: Virtual Reality, BIM, Infrastructure

Solutions:

To assess emergency situations in buildings with VR

One paragraph description of the solution:

Emergency management and planning is required for all buildings. Emergency exits are required with fire alarm installation and emergency exit windows. Using VR to collaborate with BIM helps the engineers and architects decided where is the safest and most appealing place to install safety hazards. The use of these safety precautions can be simulated through VR by simulating an emergency situation.

Link to source:

Rüppel, U., Abolghasemzadeh, P., & Stübbe, K. (2010, June). BIM-based immersive indoor graph networks for emergency situations in buildings. In *Proceedings of the International Conference on Computing in Civil and Building Engineering*(Vol. 65). University of Nottingham Press, Paper.

Reflection

Currency: cost a lot of money but for safety precautions it is worth it.
Relevancy: VR is a valuable visualization tool.
Authority: Supported by the ISEE which is a safety organization.
Accuracy: goggle scholars and properly cited.
Purpose: to simulate emergency situations and to improve safety precautions.

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Benchmarking Existing Solutions - (Liam Wolford)

Key words: Virtual Mixed Reality

Solutions:

Microsoft's HoloLens

One paragraph description of the solution (3-4 sentences):

It's a more stylized version of already made VR headsets and it basically immerses the user in a world made of holograms that they need to see to gather information. Has a commercial and personal use and differing prices. However, seem to be limited at the moment of sales and software for it.

Link to source:

M. (n.d.). Detail of light relfecting on lens of HoloLens. Retrieved March 04, 2018, from https://www.microsoft.com/en-us/hololens

https://www.microsoft.com/en-us/hololens

Reflection

Currency: Fairly current with it being backed up by the fact that it's not selling everywhere, with the price also being at $5,000 for commercial and $3,000 for developmental.

Relevancy: Really relevent because we are wanting to essentially accomplish the same level of mixed reality with our solution but try to make it cheaper that the numbers microsoft is pushing towards customers.

Authority: Microsoft is one of the leaders of the tech side of things.

Accuracy: As accurate as it can be since the producers of the article actually own the product.
Purpose: To sell but it still shows a solution that we can go off of.

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Benchmarking Existing Solutions - (Liam Wolford)

Key words: VR and Construction

Solutions:

A database that stores data then creates a 4D/VR environment.

One paragraph description of the solution (3-4 sentences):

A database was successfully constructed and implemented during a project for a School of Health. The database was stored full of drawings, schedules and any notes needed. On top of that, it had CAD and project management package alongside a GUI.

Link to source:
https://www-engineeringvillage-com.ezproxy.lib.purdue.edu/search/doc/abstract.url?&pageType=quickSearch&usageZone=resultslist&usageOrigin=searchresults&searchtype=Quick&SEARCHID=12b87f73Mb70eM450cM9422Ma337f42052c6&DOCINDEX=2&ignore_docid=inspec_480457f49722868eM6a7019255120119&database=3&format=quickSearchAbstractFormat&tagscope=&displayPagination=yes
Can't find a proper citation for it.

Reflection

Currency: Was published in 2003.

Relevancy: Fairly relevant because part of our plan was having a program that can read the blueprints, so this can teach us a way to store everything necessary and accomplish it effectively.

Authority: Staff from the School of Science and Technology from University of Teesside were behind this.

Accuracy: Accurate because they were with this project the whole way.

Purpose: To inform the reader.

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Benchmarking Existing Solutions - (Liam Wolford)

Key words:

VR and Archtitecture

Solutions:

A practice method for implementing VR.

One paragraph description of the solution (3-4 sentences):

This paper explains a method of implementing VR alongside discussing the many uses VR has had in other areas. These areas include military, education, corporations, art and entertainment. This paper also discussed the pluses of VR in urban planning.

Link to source:

Yonghua, J. (2017). An Improved Practice Method and Value Analysis of Computer Simulation VR Technology Application in Urban Garden Landscape Project Design. *Revista De La Facultad De Ingenieria*, *32*(16), 968-971.

Reflection

Currency:Was published in 2017 so it was just last year.

Relevancy: Relevant because it discusses the benefits of our solution.

Authority:Comes from a staff member from a college, so the author is fairly educated on the topic being discussed.

Accuracy: Unsure.

Purpose:To inform the reader about the benefits of VR being included in Urban planning.

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Benchmarking Existing Solutions - (Aidan Fant)

Key words: Urban Environment, Virtual reality, Augmented reality

Solutions: Virtual Real Places

One paragraph description of the solution (3-4 sentences):

This source stated how they wanted to use affordable off the shelf technology such as VR headsets to use the WWW(world wide web) for visualization, modeling and analysis of urban infrastructure. The source considers applications of these technologies in ranges of context: local planning, urban design, development control, community participation, education and training. Two distinct categories of design scenarios “Virtual Real Places” and “Real Virtual Spaces” will be facilitated. The first type, “Virtual Real Places” refers to scenarios using three-dimensional models of real world places (e.g., real developments sites in London). Whilst “Real Virtual Spaces” will be completely fictional models, not related to any particular real place.

Link to source: https://www.sciencedirect.com/science/article/pii/S0198971598000143

Reflection

Currency: Was from a textbook in 1998
Relevancy: Relevant because it relates to our problem
Authority: Comes from college textbook
Accuracy: unsure
Purpose:To educate readers in the late 90’s about the rise of virtual reality

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Benchmarking Existing Solutions - (Aidan Fant)

Key words: Urban Environment, Virtual reality, Augmented reality

Solutions: A handheld augmented reality system
One paragraph description of the solution (3-4 sentences):

A handheld augmented reality system aiding workers for utility companies in outdoor tasks, such as maintenance and planning/surveying land. Our work addresses these issues using spatial interaction and visualization techniques for mobile AR applications and as well as for a new mobile device design.

Link to source: https://link.springer.com/article/10.1007/s00779-008-0204-5

Reflection

Currency: College textbook from May 2009
Relevancy: Relevant because it relates to our problem
Authority: Comes from college textbook
Accuracy: More accurate than last source, as this one is more current
Purpose: To introduce a new kind of virtual reality system

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Benchmarking Existing Solutions - (Aidan Fant)

Key words: Urban Environment, Virtual reality, Augmented reality

Solutions: realistic 3D visual display
One paragraph description of the solution (3-4 sentences):

Virtual reality could be used for communicating urban flood risks to authorities and the public, as realistic 3D visual display is much more useful and suitable than detailed flood maps. They introduce an alternative approach for simulating three-dimensional flooding dynamics in large- and small-scale urban scenes. Named “Particle in Cell”, it is a particle based CFD method that is used to accurately predict physical plausible results instead of accurate flow dynamics.

Link to source: http://wst.iwaponline.com/content/77/2/518

Reflection

Currency: College textbook from January 2018
Relevancy: Relevant because it relates to our problem
Authority: Comes from college textbook
Accuracy: Not very accurate when it relates to urban infrastructure
Purpose: To predict physical plausible results instead of accurate flow dynamics.

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Benchmarking Existing Solutions - (Austin Johnson)

Key words: Urban Environment, Virtual reality

Solutions: Navigation using Augmented Reality on mobile device

One paragraph description of the solution (3-4 sentences):

This source stated that its purpose was to propose the use of specific system architecture, based on mobile device, for navigation in urban environments. They wanted to test the effectiveness and whether or not it enhances the experience when using location based services. By testing various Virtual Reality methods, they were able to use this data to work on augmented reality and their first results of testing were successful.

Link to source: https://www.jvrb.org/past-issues/3.2006/772

Reflection

Currency: From a paper published in 2007 - semi outdated
Relevancy: It relates because we need to understand how virtual reality and augmented reality work.
Authority: Published by a University
Accuracy: Unsure
Purpose:To propose the use of augmented reality for navigation purposes.

Transition between benchmarking and fieldwork

Once we had a better understanding of the architecture-VR cross section, we will now need to try and find problems within this area based off of what we learned. In order to find a possible problem, each team member was sent out to do some fieldwork. The following section is what everyone found during the fieldwork phase.

Introduction to fieldwork

The next step in our design process is fieldwork. The purpose of fieldwork is to find problems that occur in everyday life that is affected by your area of concern. The fieldwork we did consists of interviews and quiet observations. Each member would conduct one interview and two observations or two interviews and one observation, and take carefully documented notes for each situation. The questions of the interviews and the locations of the observations are geared throughs the stakeholders in the architure-VR area.

Fieldwork- (Jacob)

Ethnographic Research - Interview 1	**Tech 120**	**Spring 2017**

Interviewer Name:	**Jacob Smith**	**Date:**	**March 6, 2018**
Interviewee Name:	**Mitch Imler**	**Time**	**5:00 p.m.**
Interviewee Description:	Mitch is a sophomore student in the school of technology. He is majoring in Construction Management Technology. He is a great fit for the interview because Construction Management majors are required to take a CGT class. Our group is focused on making a software that is compatible with Virtual Reality that can help make the design build process more efficient and creative.		
Question 1:	What are your thoughts on the use of Virtual Reality merged with construction design software?		
Question 2:	What are your thoughts on the current methods of the design process for construction?		
Question 3:	What are your thoughts on how efficient the design build process of the construction industry is right now?		
Question 4:	What are ways that the construction industry could improve in efficiency by using a Virtual Reality set.		
Question 5:	Do you think that using a Virtual Reality set to help with the design aspect of a project would be beneficial? If so, in what ways?		
URL to Recording:	https://www.youtube.com/watch?v=iuD7VvX3Jv0		

Speaker	**Timestamp**	**Transcript**
Jacob	0:00	I introduce myself and ask Mitch to introduce himself.
Mitch	0:05	Mitch introduces himself.
	0:10	I ask Mitch the first question.
	0:15	Mitch responds...
	0:20	Mitch responds...
	0:25	Mitch responds..
	…	I continue to ask Mitch questions and he gives his answers.

Notes, Thoughts, and Observations:

I think that the interview went well. Mitch seemed to know a lot about the construction industry and how the design build process worked. He gave great input about the topic and helped with the process.

Ethnographic Research - Observation 1	Tech 120	Spring 2017

Observer Name:	**Jacob Smith**	**Date:**	**March 6, 2018**
Location Name:	**Class of 1950**	**Time**	**1:30 p.m.**
Description of Location at the Time of Observation:	The class was learning about Computer Graphics Technology. The class was mostly full once class began. There was only one teacher and two TA's. It was a large lecture hall. The people were mostly majoring in Construction Management or some kind of Construction Engineering. This is important to our topic because these will be the future workers that could be using our Virtual Reality construction software.		
URL to Recording/ photo of observation:			

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	What? (What are they doing?)	How? (How are they doing it?)	Why? (Why are they doing it this way? Take a guess!)
1	Learning about CGT.	Images and notes were placed on the projector.	It is a beneficial way to learn new material.
2	Talking about different views of a sketch.	The teacher was showing multiple sketches on the projector and talking about their differences.	This way they would be able to distinguish the difference the difference between angles and views.
3	Took a quiz over orthographic angles.	They were told to answer the question on the board with a half sheet of paper.	This way they could save paper.
4	Teacher introduced the next assignment.	Teacher put up an outline of what the next assignment should entail.	This way the students would know what is expected of them for the next assignment.
5	Teacher performed an example of how to work on the assignment.	The teacher put an example on the board and walked the students through the process of how to complete the assignment.	This way the students would have an idea of how to complete the assignment.

< add as many rows as you need >

Possible problems observed: There were some slides of notes that were clicked through very quickly, which might not have given the students enough time to get all of the information written down. Some of the sketches were not explained in detail, which left some confusion for the class.

Quantitative data related to problem:

1. 6 out of 10 people were actively engaged in the lecture.
2. 1 out of 10 were asking questions about the assignment.
3. 10 out of 10 were involved in taking the in class quiz.

Notes, Thoughts, and Observations:

I thought that this was overall a well run class. It was a large lecture hall so obviously everyone will not be paying attention, but a good percentage seemed actively engaged in the class discussion.

Ethnographic Research - Observation 2	Tech 120	Spring 2017

Observer Name:	**Jacob Smith**	**Date:**	**March 6, 2018**
Location Name:	**Physics Building**	**Time**	**3:00 p.m.**
Description of Location at the Time of Observation:	This is a CGT lab section. these students are working on the assignment that was assigned in lecture. It is a two hour lab. The TA was in charge of the lab section. The students were often asking the TA for assistance with the homework assignment.		
URL to Recording/ photo of observation:			

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	What? (What are they doing?)	How? (How are they doing it?)	Why? (Why are they doing it this way? Take a guess!)
1	They were working on the computer assignment.	They were using the CAD on the computers in the lab room.	CAD is a CGT software.
2	They were working on the sketching assignments.	They were using the printed out sheets.	This way they could make changes on thee paper if they make mistakes.
3	They were asking the TA for help.	They would bring the TA over to the monitor.	This way the TA could have a visual to answer their question.
4	They were conversing with each other to help make sense of the assignment.	They were talking to each other.	This way they could bounce ideas off of each other to find a solution.
5	They did additional online research to help finish the assignment.	They used search engines.	This way they didn't have to ask the TA for every question they had.

< add as many rows as you need >

Possible problems observed:	The TA was helpful, but she didn't answer all of their questions. This could result in a low score on the assignment. Also when the students were working on the sketching assignments they were not putting enough time in.
Quantitative data related to problem:	1. 9 out of 10 student interaction with the assignment. 2. 7 out of 10 aid from the TA on the assignment. 3. 6 out of 10 effort on the sketching assignments.

Fieldwork- (Alex)

Ethnographic Research - Interview 1	**Tech 120**	**Spring 2017**

Interviewer Name:	**Alex Rasmussen**	**Date:**	**3/6/18**
Interviewee Name:	**Brandon Speakman**	**Time**	**9:00 pm**
Interviewee Description:	Male, long brown hair, facial hair, glasses		
Question 1:	What is your name?		
Question 2:	What do you think makes good architecture, inside and outside?		
Question 3:	What makes a building uncomfortable to you?		
Question 4:	Are you comfortable in this room? Why?		
Question 5:	If this room's ceiling was something like 30ft high, would that be uncomfortable? Why?		
Question 6:	Does furniture play a role in good design? What about lighting?		
URL to Recording:	https://drive.google.com/open?id=18xO-8nOdi5FZMBcppIKFT58LJZ3WexSB		

Speaker	Timestamp	Transcript
Alex	0:00	So, what is your name?
Brandon	0:05	Brandon Jay Speakman.
Alex	0:07	What do you think makes good architecture, like on the inside and outside?
Brandon	0:26	On the inside, it has to have reasonable floor plan that isn't too hard to figure out, in the case of emergencies and stuff. If anybody hasn't been in the building before, they should be able to get out easily. And on the outside, it should be structurally sound, I guess, without looking like a brick planted in the dirt.
Alex	1:00	What makes a building uncomfortable to you?
Brandon	1:15	It makes me uncomfortable if the building is like super old and I feel like it's going to crumple around m.
Alex	1:22	Are you comfortable in this room right now?
Brandon	1:32	Yes
Alex	1:33	Why?
Brandon	1:38	Because I don't feel like it's going to crumple around me.
Alex	1:47	So, if the ceiling of this room was like 30ft high, would you feel slightly uncomfortable?
Brandon	1:59	Yeah, it would make me feel uncomfortable.
Alex	2:00	Why's that?
Brandon	2:02	Because big places are intimidating to small people like me.

Alex	2:09	Do you think furniture plays into the role of good design?
Brandon	2:17	Yeah, as long as it's tasteful and not in people's way.
Alex	2:25	Does it also have to match to walls and floor like that kind of stuff?
Brandon	2:28	Not necessarily it has to match the materials, but like color scheme.
Alex	2:35	What about lighting?
Brandon	2:37	Lighting should be, if it's a lobby, it doesn't need to be super bright, like an office area, but depends on the work space, the space is used for.
Alex	2:49	And like this light we have right now, it's yellow light, like why do you think it's yellow?
Brandon	2:59	Because it's a calming color, but it's not like, it's like cooler than bright white, but it's like makes me think of like office space where you always have to work, but it's not too dim that you can't like use the space, so it's like in the middle.
Alex	3:21	Green and blue are also bright, calming colors, so why not that?
Brandon	3:28	Because it's weird.
Alex	3:36	That's all the questions I have for you. Thank you for your time.
Brandon	3:38	Yeah, you're welcome.

Notes, Thoughts, and Observations:
It would be better this I had more time to do more interviews with different people.

Ethnographic Research - Observation 1	**Tech 120**	**Spring 2017**

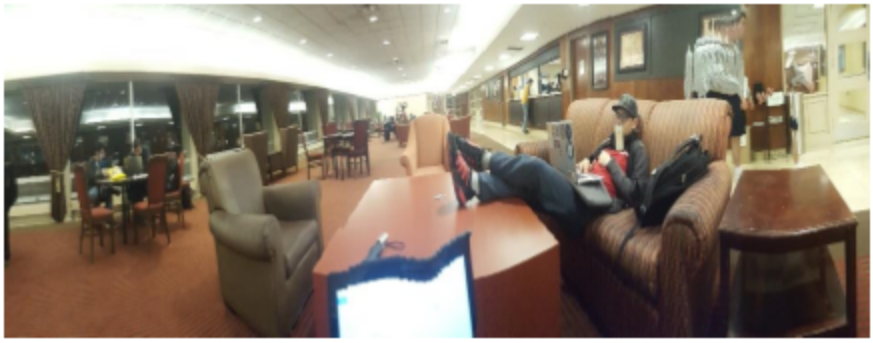
Observer Name:	**Alex Rasmussen**	**Date:**	**3/6/18**
Location Name:	**WALC Study room**	**Time**	**6:49 pm**
Description of Location at the Time of Observation:	Bunch of people studying in a large room, everyone is quiet.		
URL to Recording/ photo of observation:			

	What? (What are they doing?)	**How?** (How are they doing it?)	**Why?** (Why are they doing it this way? Take a guess!)
1	Studying/working	Quietly using their laptops	They can focus here because the architecture is comforting
2	People looking out the window	Sitting in a chair, facing the window	The chairs were set there to overlook the outside area
3	People on the third floor looking in this room (on the second floor)	Sitting at tables, next to a window into this room	To connect places (visually) in the building
4	Huge picture of Washington crossing the Delaware	Placed on a wall for all to see	To inspire people with the American Spirit
5	Everything is well lit with a yellow light	By using a lot of lights	To comfort people by making them subconsciously think it's sunlight

Possible problems observed:	None , because this building was created well so people can focus on the task at hand
Quantitative data related to problem:	N/a

Notes, Thoughts, and Observations:
If buildings are designed poorly or too well, people will notice and become distracted. WALC is also the newest building on campus.

Ethnographic Research - Observation 2	**Tech 120**	**Spring 2017**

Observer Name:	**Alex Rasmussen**	**Date:**	**3/6/18**
Location Name:	**Tarkington Hall Lobby**	**Time**	**7:40 pm**
Description of Location at the Time of Observation:	A few people doing a number of different things.		
URL to Recording/ photo of observation:			

	What? (What are they doing?)	**How?** (How are they doing it?)	**Why?** (Why are they doing it this way? Take a guess!)
1	Some people are studying	Alone on their laptops	The open space
2	Some people are playing a board game	At a table, somewhat quietly	A large enough space to play and be subconsciously comfortable
3	One person is sleeping	On a chair in the corner of the room	Comfortable enough to fall asleep
4	One person is playing the piano	Very nicely	Because there is a piano here people can go up and play

Possible problems observed:	None- because this building was created well so people can focus on the task at hand
Quantitative data related to problem:	N/a

Notes, Thoughts, and Observations:
This room was designed to be an open commons area for everyone to use.

Fieldwork- (Dylan)

Ethnographic Research - Interview 1	**Tech 120**	**Spring 2017**

Interviewer Name:	**Dylan Zamsky**	**Date:**	**3/6/18**
Interviewee Name:	**Cory Clark**	**Time**	**3:27**
Interviewee Description:	Cory Clark is a CGT 164 teacher. the class is to teach students in civil engineering or construction management the fundamentals of Building Information Modeling. THe programs taught include AutoCAD and Revit.		
Question 1:	WHat do you think students have the biggest issue using BIM programs? Why?		
Question 2:	Have you ever used a program that was adaptable to virtual reality? if so, what was the program? what was it like (high or low resolution, helpful?)?		
Question 3:	Do you belive virtual reality can be used in building information modeling classes at purdue university for learning purposes and explain?		
Question 4:	Do you believe virtual reality can collaborate with Building information modeling to be used by companies in the industry and why?		
Question 5:	DO you know of any companies that currently use virtual reality for design and construction? what is the company name and how do they use it?		
URL to Recording:	https://drive.google.com/file/d/1urumaFDHg7SN7Wtsn_wnBXLtQSFPnun3/view?usp=sharing *This video had to be shortened because I could not transfer a 20 minute video let alone a 5 minute video to my google drive.*		

Speaker	Timestamp	Transcript
Cory	0:00-2:00	They think BIM is an application while it is a process. If students can get past the process of thinking BIM is an application students will understand BIM.
Cory	2:00-3:30	Talked about how Civil engineering is very different from Construction
Cory	3:30-6:10	In process of researching a program called Unity. takes revit, and computes it into VR. also the program fuxor. directly pipes revit into a virtual world. cost about 750 dollars a month. They don't have an educational version of fuxor. Student versions are usually limited. Applications for VR require amazing supercomputers.
Cory	6:10-8:20	Believes and wants VR to be used for educational purposes for construction applications. it is already in the works. He wants to do augmented reality which is a VR but within the world we live in, not in a random room. Almost every company is researching VR and AR for design purposes.
Cory	8:20-13:20	Believes VR to apply to industry. They send clients VR headset and show them designs in real time. It allows the client to change design and state

		his opinions. THe designers can change the designs on the stop to suit his needs
Cory	13:20-17:45	Pepper company and every large company is using Vr on their projects and if they arent they are researching it. Other companies that use VR are Toll brothers, DPR, Beazers homes, bowen, west chester mechanical

Notes, Thoughts, and Observations:
From my interview I have learned that VR to help construct the urban infrastructure is something that is being used by every construction company. What our project may need to focus on is the educational side of it. Their are very few educational facilities for virtual reality on campuses but to have one at purdue would be a great asset for so many people on campus.

Ethnographic Research - Observation 1	**Tech 120**	**Spring 2017**

Observer Name:	**Dylan Zamsky**	**Date:**	**3/6/18**
Location Name:	**PHYS 114 -CGT 164**	**Time**	**11:36**
Description of Location at the Time of Observation:	The location was in a large lecture hall in physics. the class was CGT 164 and was being instructed by an experienced construction manager. the class teaches autocad and revit modeling. Isometric sketches and auxiliary sketches were being lectured to the class today.		
URL to Recording/ photo of observation:	https://drive.google.com/open?id=1nHh0o0x_J5mxmtR5kL8cxCXU6GIafu4c		

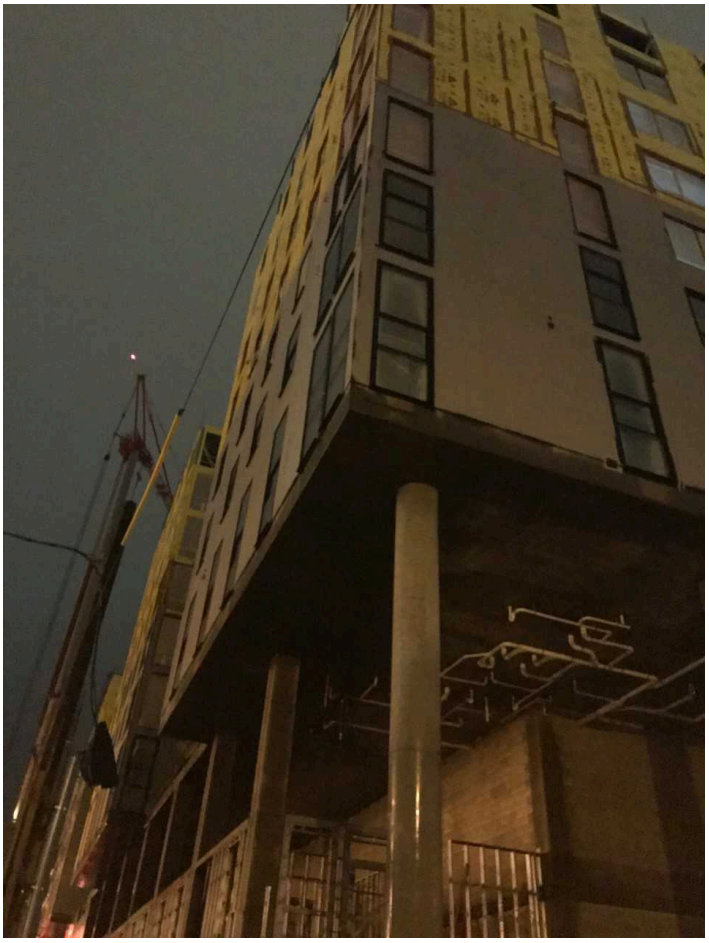
	What? (What are they doing?)	**How?** (How are they doing it?)	**Why?** (Why are they doing it this way? Take a guess!)
1	students are taking notes	they take notes on their phones and laptops. most of the students record the lectures.	Students take notes because all of the design programs are downloaded onto the computer. students want to be able to pull up videos and notes while they are doing homework assignments
2	students are asking questions	students are confused by the homework assignment and ask questions for a long time at the end of class	The assignments are very complicated and need a lot of clarification
3	instructor is lecturing whole time	instructure teaches very quick and it could be slower	their is a lot of information to get across so students don't depend on office hours and SI sessions
4	students are taking a quiz	students are collaborating with each other to figure out the difficult quiz questions.	So students can help other students figure out how to solve the problems.
5			
	< add as many rows as you need >		

Possible problems observed:	student understanding how to BIM and use design applications
Quantitative data related to problem:	

	BIM takes a long time to master but students are suffering in classes because of how courses are taught.

Notes, Thoughts, and Observations:
A new technique for teaching this course would be beneficial to the student and the students education standards. Teaching BIM with VR would be great for students. It is good for them to understand VR in urbane infrastructure because in the next decade blueprints may cease to exist and Vr will replace it.

Ethnographic Research - Observation 2	**Tech 120**	**Spring 2017**

Observer Name:	**Dylan Zamsky**	**Date:**	**3/6/18**
Location Name:	**The HUB**	**Time**	**4:54**
Description of Location at the Time of Observation:	Workers on the jobsite are just finishing up until they can go home. Machines are currently being used and tools are blaring loud		
URL to Recording/ photo of observation:			

	What? (What are they doing?)	**How?** (How are they doing it?)	**Why?** (Why are they doing it this way? Take a guess!)
1	Using tools	They are using tools depending on what needs to be complete	So they can stay on schedule (similar to Gantt chart)
2	using machines	Lifting heavy objects or people to higher levels	To complete harder tasks in the safest possible way

3	looking at blueprints	interpreting dimensions and angles to correctly build	So the client is satisfied with the work his workers are doing

Possible problems observed:	The staircases are unsturdy and the steps vary in depth. It is easy to hit your head wherever you are inside the building.
Quantitative data related to problem:	Construction on the jobsite is dangerous and VR could be use to teach college students how to be safe in certain simulated situations through VR.

Notes, Thoughts, and Observations:
Safety is key when on a jobsite and it is very easy to get injured. If my group is trying to use VR for teaching purposes, I believe it could be used to teach students how to be safe on the jobsite by simulating dangerous situations and having students adapt to the situations using VR.

Fieldwork- (Liam)

Ethnographic Research - Interview 1	**Tech 120**	**Spring 2017**

Interviewer Name:	**Liam Wolford**	**Date:**	**03-06-2018**
Interviewee Name:	**Alston**	**Time**	**2:45**
Interviewee Description:	Student who has taken TECH 120 before and has done his own research of VR and the classroom		
Question 1:	Would you want a VR learning environment? Why?		
Question 2:	How do you think professors will react the the implementation of VR?		
Question 3:	How do you think students will react to the implementation of VR?		
Question 4:	Do you personally think that teaching is the future of teaching? Why?		
Question 5:	Why do you think that VR should be included in the classroom?		

Speaker	**Timestamp**	**Transcript**
	Question 1 Response	Yes, since I am a hands on learner, being able to be immersed in something that puts the material right in front of me helps a lot because then I am able to look at everything and more easily understand
	Question 2 Response	Depends on the course being taught. Of course, Technology professors will be all over it because they understand the growing tide of technology and see the potential however some professors won't because they may not want to change their course curriculum where necessary
	Question 3 Response	Because of the rising popularity of VR, they should like it overall
	Question 4 Response	Yes because many schools and businesses are already finding ways to incorporate VR into daily life
	Question 5 Response	It will help visual learners like myself and those who are struggling to understand certain concepts being taught another way to understand what is going on in the classroom and will result in better educated people.

Notes, Thoughts, and Observations:

He was really enthusiastic about the idea and seemed to be a bit biased about the topic. On top of that, he didn't really think before he answered.

Ethnographic Research - Interview 2	**Tech 120**	**Spring 2017**

Interviewer Name:	**Liam Wolford**	**Date:**	**3/6/2018**
Interviewee Name:	**Mike Coots**	**Time**	**3:00**
Interviewee Description:	Professor who teaches TECH 120		
Question 1:	As a professor, what are your thoughts on implementing VR into the classrooms to help reinforce what you are teaching?		
Question 2:	How would Professors respond to the implementation of VR		
Question 3:	Do you think Professors would need to change their curriculum?		
Question 4:	How do you think students would respond?		
Question 5:	Do you personally think that VR has a future alongside teaching and how big?		
URL to Recording:	https://drive.google.com/open?id=15EUfCjfVoMmnKGQufwbj-VUP-0gaHGaf		

Speaker	**Timestamp**	**Transcript**
	Question 1 Response	VR wouldn't be the best tool to help with instructional materials ,such as the design process. But I do see it utilized as a prototyping tool. A program that does more prototyping would allow for more testing
	Question 2 Response	If the resources were available to go with the option of choosing VR, it would be leveraged to make learning environments safer. I don't think that there would be adverse reactions to it unless they would given the software and told to use it.
	Question 3 Response	Not change the curriculum but change how it is implemented. Courses that have labs might need that transitional phase where the safety mechanics are run through VR then they move on to real life.
	Question 4 Response	Most people would be excited, even if they get motion sick. It will be a good way to increase engagement and motivation in students. The trick will be not let it become a gimmick. If it offers something useful, great, but as soon as people get used to it it becomes a hassle.
	Question 5 Response	I think so. I don't think it's going to change methodologies, it will just become another tool. You can expect some people to misuse the technology but in the end it will become a useful tool when leveraged properly.

Notes, Thoughts, and Observations:

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Gave a more educated point of view, seemed as if he has thought about this before and educated himself to attain the thoughts that he has. Did take more time to explain his thoughts and answers that were given and with a lot more detail than the previous interview.

Ethnographic Research - Observation 1	**Tech 120**	**Spring 2017**

Observer Name:	**Liam Wolford**	**Date:**	**3/6/2018**
Location Name:	**Cary South Basement**	**Time**	**8:30**
Description of Location at the Time of Observation:	Students sitting around at random tables working on homework		
URL to Recording/ photo of observation:			

	What? (What are they doing?)	**How?** (How are they doing it?)	**Why?** (Why are they doing it this way? Take a guess!)
1	Working on homework	Having the problems or whatever it is they are working on displayed on the computer then going through with pencil and paper or textbook.	No other real way to do the homework or material being assigned to go over.

2	Communicating with friends for help	Leaning over and asking a question	To understand what exactly it is that they have a problem with.

Possible problems observed:	Difficulty understanding the material that is put in front of them for them to work through.
Quantitative data related to problem:	In my time there, at least 8 students showed a sign of frustration or tried to get some sort of help.

Notes, Thoughts, and Observations:
A thought that I have is how VR can help these students with their understanding of certain material, but only application base, such as trying to understand how a math problem works and having the picture put in front of them in three-dimensional space.

Fieldwork- (Aidan)

Ethnographic Research - Interview 1	**Tech 120**	**Spring 2017**

Interviewer Name:	**Aidan Fant**	**Date:**	**3/5**
Interviewee Name:	**Nathan Dinius**	**Time**	**8:45pm**
Interviewee Description:	First year student, Mechatronic major, from malaysia		
Question 1:	Have you had an prior experiences with VR?		
Question 2:	Have you done any research on VR?		
Question 3:	Have you seen any VR headsets been used in classrooms, and would you like to eventually use on in class?		
Question 4:	Do you think VR will have a good impact on your majors or any other majors?		
Question 5:	Do you think VR is the way of the future?		
URL to Recording:	https://www.youtube.com/watch?v=1KI8irXbWDc		

Speaker	**Timestamp**	**Transcript**
	0:00	
	0:05	
	0:10	
	0:15	
	0:20	
	0:25	
	…	< add as many rows as you need >

Notes, Thoughts, and Observations:
Enjoyed using VR, sees it as a gateway to the future, and could be used for all classes/majors.

Ethnographic Research - Observation 1

Tech 120 **Spring 2017**

Observer Name:	**Aidan Fant**	**Date:**	**3/7**
Location Name:	**EE 129**	**Time**	**7:30 AM**
Description of Location at the Time of Observation:	EE 129 lecture hall, CGT 163 Theory Lecture		
URL to Recording/ photo of observation:			

	What? (What are they doing?)	**How?** (How are they doing it?)	**Why?** (Why are they doing it this way? Take a guess!)
1	Taking notes on Mechanical computer graphics	Program called CATIA	For class participation and notes

Possible problems observed:	using program that gives 3D effects won't be the same as using VR.
Quantitative data related to problem:	Lecture on a class that uses 3D programs to build mechanical machines, VR could be potential substitute

Notes, Thoughts, and Observations:

Class is overall an Ok class, Catia does offer users a 2D and 3D view, but we would have no idea if the product made would work or be feasible unless we were to actually print the product first. Time consuming

Ethnographic Research - Observation 2	**Tech 120**	**Spring 2017**

Observer Name:	**Aidan Fant**	**Date:**	**3/5**
Location Name:		**Time**	**8:30 pm**
Description of Location at the Time of Observation:	Lobby of McCutcheon, People in background		
URL to Recording/ photo of observation:			

	What? (What are they doing?)	**How?** (How are they doing it?)	**Why?** (Why are they doing it this way? Take a guess!)
1	Nathan (in picture) is using VR	Through a VR headset and app	to experience VR
2	Riding in a roller coaster in VR	Through a VR headset and app	to experience VR

Possible problems observed:	VR apps are very limited
Quantitative data related to problem:	Can view pictures from all different angles

Notes, Thoughts, and Observations:
Experiencing VR for the first time was definitely a fun thing to do, but I felt there is much need for improvements.

Fieldwork- (Austin)

Ethnographic Research - Interview 1	**Tech 120**	**Spring 2017**

Interviewer Name:	**Austin Johnson**	**Date:**	**3/5/18**
Interviewee Name:	**Lucca Mckay**	**Time**	**7:45 pm**
Interviewee Description:	Purdue User Experience Design student. Sophomore.		
Question 1:	Explain your experiences with design		
Question 2:	What design is to you		
Question 3:	Examples of design in the real world		
Question 4:	What areas of design interest you		
Question 5:	Final thoughts on design		
URL to Recording:	https://drive.google.com/open?id=1p8HyMUZkBIDzsX67xDxGM8BlBpuYaXzr		

Notes, Thoughts, and Observations:
The design process is extremely task heavy and he believes everything around us that isn't nature went through this process

Ethnographic Research - Interview 2	**Tech 120**	**Spring 2017**

Interviewer Name:	**Austin Johnson**	**Date:**	**3/6/18**
Interviewee Name:	**Greg Sirko**	**Time**	**9:00 pm**
Interviewee Description:	Purdue UX Design Student Junior		
Question 1:	Can you explain your experiences with design?		
Question 2:	What design is to you?		
Question 3:	Can you provide examples of design in the real world?		
Question 4:	What areas of design interest you?		
Question 5:	Any final thoughts on design?		
URL to Recording:	https://drive.google.com/open?id=1X1ceyszLcp94eFIQFpT-uwCBp25Fo8vB		

Notes, Thoughts, and Observations:
Design is his passion and is extremely interested in multiple fields of design. Loves the process of building something with this process

Ethnographic Research - Observation 1	**Tech 120**	**Spring 2017**

Observer Name:	**Austin Johnson**	**Date:**	**3/5/18**
Location Name:	**WALC 3121**	**Time**	**12:30**
Description of Location at the Time of Observation:	User Experience Design class 20+ students		
URL to Recording/ photo of observation:			

	What? (What are they doing?)	**How?** (How are they doing it?)	**Why?** (Why are they doing it this way? Take a guess!)
1	Discussing different forms of design and how they relate to the real world	They are group around a whiteboard and conducting in ideation as a team.	They were doing this because it allows for collaboration and discussion.
2	Talking about different forms of applied knowledge	Grouped around the whiteboard and writing ideas on given topic.	This promotes discussion within the groups and also allow for teams to report out.
3	Groups are separating into different tables	They are moving to separate tables	I believe this is to discuss current projects and what they're going to work on next.

4	The teams are discussing how to go about their current problem.	One person stands at whiteboard while others sit and discuss ideas, the person at the whiteboard writes these ideas on the board.	They are doing this to get ideas out and solve the issue that they are working on.

Possible problems observed:	Many users disagree while ideating information from professor isn't completely understood
Quantitative data related to problem:	How thoughts go into design and why How designing an application for design for vr would benefit ideating and creation

Notes, Thoughts, and Observations:

Transition between fieldwork and Criteria

Through our group's field work, we managed to gather valuable information about how virtual reality is used in the education system. The invision center provides students the opportunity to research virtual reality but does not utilize it as a teaching mechanism for courses. Many professors like Cory Clark feel that their is now a modern need for virtual reality because it is used everyday in the field for many disciplines. A set back we discovered about bring virtual reality to education is the price tag. Virtual reality is not cheap and needs to be more affordable. Our group has utilized all of the information gathered from our fieldwork and have created constraints and criteria that point in the right direction.

Constraints and Criteria

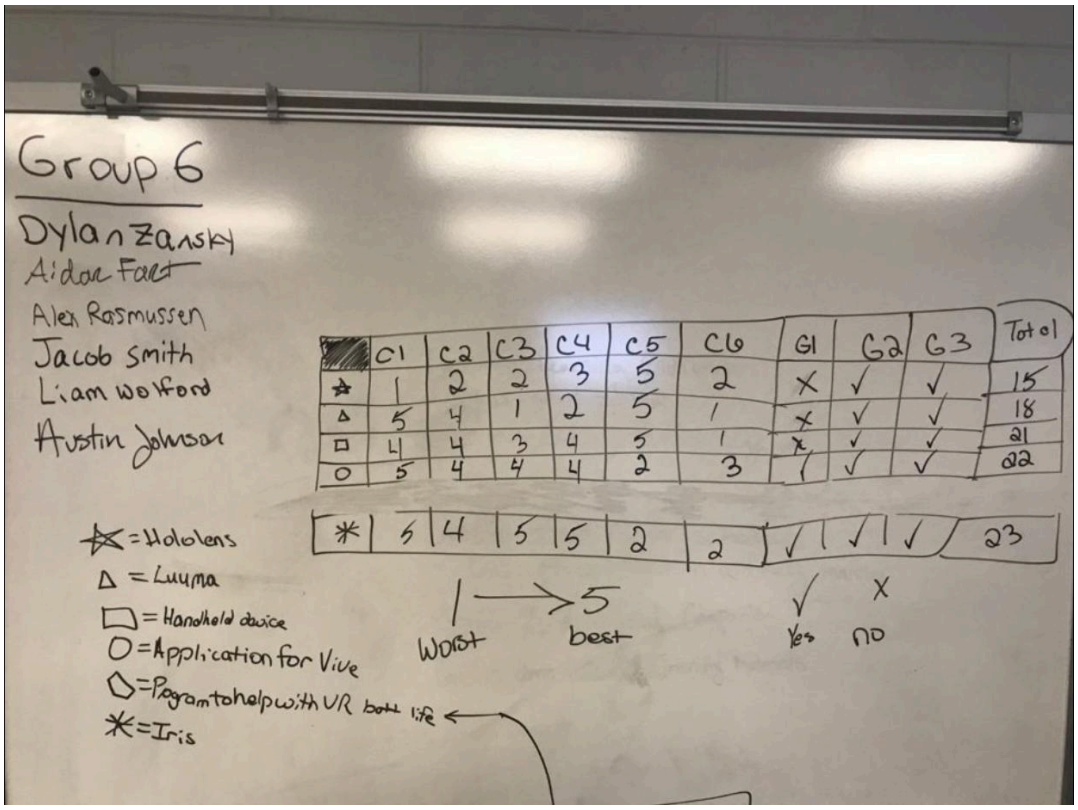
Constraints-

1) It must be simple and quick to make a high resolution GUI if and when this product goes into production
2) The creation and executable things that the program must do has to be feasible
3) The time to design and create the program must be quick

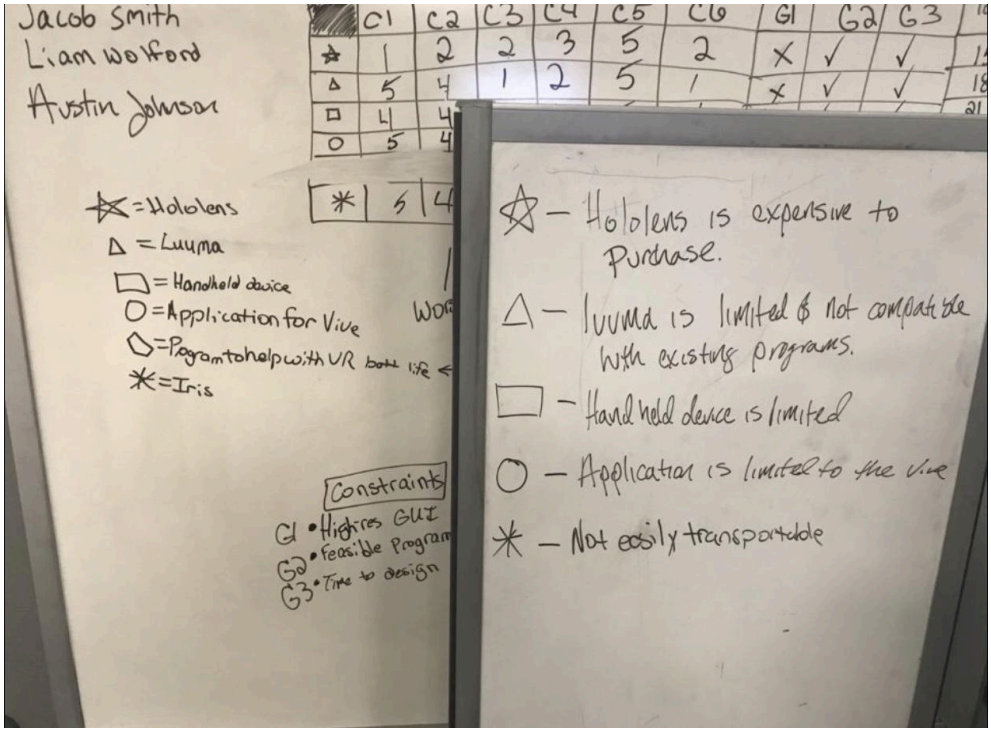
Criteria-

1)Easy for the customer to use
2)Must have the ability to be widely used
3)Selling price @ $100 per semester when it comes to schools
4)Selling price @ $100 per month when it comes to companies
5)Must be compatible with current Operating Systems and VR headsets.

Decision Matrix



(Ranking different ideas and prototypes via the criteria listed above.)



(initial conclusions based on the matrix.)

Transition from Decision Matrix-
After going through the Decision Matrix and determining the value and worth of the ideas presented. In the end, an application that is to be used for Vive, equipment that can handle VR. It was after going through this decision matrix that we found out that we really wanted to go ahead with development of a program for VR.

Transition into Mentor Meeting 1-
After deciding that we were going to go ahead with the VR program, we decided to communicate with our Mentor what it is that we are trying to do. After Aiden and Liam talked to Ken Burbank, the mentor informed them that he would get some names for them so they could do a bit more research. The meeting is as follows.

Virtual reality, infrastructure, education
Program that lets construction management majors, go into a virtual reality simulation that creates a 3D blueprint, helps students understand design process
Focus on education aspect, company aspect
B.I.M building info modeling, started CAD based
Faculty member that has joint CGT and Construction management
Need to look at all angles
Scope is huge
Spatial test, improves graduation, gender and cultural differences
Maybe enough stuff to demonstrate

Tools are available, likes the idea
Envision center
Poll on VR being included in design process
Aidan is a keeper :)
Not a VR person :/
Mary sudowski
He'll get us names

Transition into Mentor Meeting 2:

Ken gave us a professor who teaches computer graphics for construction and civil engineers. Dylan already interviewed him for his fieldwork but only asked questions about the programs he teaches. Cory Clark is an experienced professional in the field of construction management and has used virtual reality in the field for years. He gave us a lot of insight on our project and it helped us revise our prototype- and POV drastically to the best it could be.

Gantt Chart

Month	Feb		Mar				Apr				Responsibility
Week	8	9	10	11	12	13	14	15	16		
Task											
Project Definition											Dylan and Liam
Benchmarking											Alex and Liam
Fieldwork											Alex and Dylan
Problem Refinement											Dylan
Ideation											Jacob, Aidan, Dylan, Alex, Austin, and Liam
Solution Analysis											Jacob, Aidan, Dylan, Alex, Austin, and Liam
Prototype Development											Alex and Liam
Prototype Critique											Jacob and Dylan
Prototype Finalization											Liam
Journal Usability											Jacob, Aidan, Dylan, Alex, Austin, and Liam
Infographic Development											Alex
Final Design Journal											Jacob, Aidan, Dylan, Alex, Austin, and Liam
Presentation Preparation											Jacob, Aidan, Dylan, Alex, Austin, and Liam
Presentation Delivery											Jacob, Aidan, Dylan, Alex, Austin, and Liam

(Gantt chart showing who was in charge of completing what during each week)

TEST RESULTS AND DISCUSSION SECTION

For our first prototype, the test was to see how long it took Dylan, Jacob and Aiden to do certain tasks, such as opening a simulation or uploading information. The environment was in a room with one person at a time so the others didn't know anything about the GUI that was designed. The results showed us that the GUI that we designed was easy to follow and simple to understand and use.

As for the second test that we did, we needed to see how easy it was for users to use a program in a first person perspective since our program was then changed from VR to first person view on a computer. So, we had Liam be our control (a person who understood how to use the first person view and the program), and three people who would represent different archetype of users. These three archetypes were someone completely new, someone who knows a little bit about what they are doing, and with the last one know what they were doing but not all. This was tested by having our test subjects accomplish the same two puzzles and time them, with time showing us the ease of use of the program and this was held within the TECH 120 classroom.

The test results that we got in the same order are as follows: 1:20 (Liam), 2:32, 3:43, 4:52. This showed us that we might want to include a tutorial and info section on the GUI and maybe for the simulation so this way those who don't know much about first person view can use the program to the fullest.

Now as for the reason as to why we abandoned VR, it is because of a meeting with Clark Cory where he informed us of the fact that companies have been researching and trying

to accomplish what we are trying to do for years already and not succeeded because the technology today are not enough to accomplish the task that is needed from it. After being told this, we as a group decided to change gears from VR to just simply letting the user explore the simulated house on their computer in free use first person view.

Other than technology making us not able to attain what we want, we also have to make sure that the program and GUI itself is easy enough to use by the masses and in order to do that, we must include a tutorial mode or help section of the program.

Transition between Criteria and Refine Innovative Solutions

The purpose for creating this section is to establish a set of rules or criteria. This criteria was made so that there was something to judge possible ideas we considered for the design journal. When this set of criteria was created it formed a sense of credibility for the process of determining which idea would work best. We used several methods of determining criteria, including weighing the positives and negatives of each criteria. The result of creating this criteria is that it helped our group decide the best idea to choose.

Introduction to Refine Innovative Solutions

The goal of the process of refining innovative solutions is for each member to evaluate one of the ideas that they chose to further investigate. Each group member performed research about the possibility of their idea. The members then recorded their findings in the area below.

Refine Innovative Solutions- (Jacob)

Virtual Reality Glasses

Virtual reality is a relatively new technology. It is used mostly for entertainment. It is starting to become used for more purposes. Several companies use virtual reality to show tours of buildings, and some construction companies do similar tours of their projects. The idea that I chose to pursue was the virtual reality glasses. Virtual reality has mostly been used through a headset until this point. We are proposing that we create a computer chip that can be installed within glasses, and then worn around. The glasses would be able to identify objects within the persons line of sight and then give information about the items. It would help educate the common man. This is a method that has not yet been perfected. Most virtual reality creating companies have only been able to make entire headsets for virtual reality, which then makes the user unable to walk around. By using the glasses and the virtual reality, a user would be able to go about their daily life and be aided by the virtual reality glasses. It would be an upgrade to humans. This solution would help people solve problems they have before they even start. The glasses could analyze the path of the user and identify possible accidents and can warn the user to avoid the problem. The glasses could also analyze the environment and help the user develop better ideas to work about their life in a more productive manner.
This idea is different from other solutions in several ways. There are no models of virtual reality that are just glasses that are yet on the market. The technology has not yet been designed. This proves the innovation of this idea. These glasses would not have headphones but it would be able to show the user messages on the glasses and help them.

Refine Innovative Solutions- (Alex)

There are a lot of good VR softwares out there but there is nowhere to find them in one place. Also, some of those softwares are marketed, but not very well and only in one place. I believe this idea is innovation because as far as I know this does not exist. In a Google search, there is a marketplace that shows the software to make VR things, but not a place for the final products. Plus, with all these creators posting in one place, it could inspire co-labs and better ideas. This idea aligns with our problem statement because students could make projects in VR and then share them here for feedback and help. This solution is different than existing solutions because it will be just for the final products.

Refine Innovative Solutions- (Dylan)

POV:

Students studying construction management need to be taught how to use virtual reality in school because it is used often in the workplace.

Support:

Popular majors at Purdue include engineering and construction management. The designated fields have similarities and differences. Engineering is more theoretical and construction management is more innovative (Purdue University). SImilarly, both fields use virtual reality in the workplace. A professional in the construction field and a professor at Purdue University stated “Almost every construction company out their is either using virtual reality or researching it.” The need for students who have experience with virtual reality is at a high need in the industry. Later in the interview Cory said “There are very few schools that are involving virtual reality into the curriculum” and “I want to open up a virtual reality lab here at Purdue.” Virtual reality is at high stock in the professional work community and needs to be taught in school before the dependency on VR is too large. SOme resources that Purdue can use to execute our solution is the disposal of the technology school at Purdue. With the approval of the school, we can go further into providing virtual reality programs and designated spaces for students to use in special computer graphics classes. New curriculum will need to be constructed to make room for some of these knew classes and possibly a free elective virtual reality class can be designed so every student at purdue university has access to virtual reality, non-dependent on major.

Citations:

Clark, C. (2018, March 6). Personal interview.

Purdue University. (2016). Prospective Students. Retrieved March 19, 2018, from https://polytechnic.purdue.edu/prospective-students]

Refine Innovative Solutions- (Liam)

While brainstorming solutions, the idea of putting the program on a remote server that is accessed through a VPN was thrown out there. Since it does help cut down on costs and helps decrease the time to fix since there is only one piece of technology that has the program, it was something worth researching. While research did prove the statements made beforehand, another thought process came in that said that this in itself is not a real solution, it's just something to keep in mind. It doesn't really help or tie in into our POV statement and just makes things more complicated since we would then have to worry about VPN software and making sure that remote servers can handle to workload that the program may require. It is because of this that we as a group decided to toss it so we can mainly focus on creating the program itself first.

Refine Innovative Solutions- (Aidan)

1. College students currently enrolled in a major or minor that involves a design process stage need an alternative way to learn because current design processes are a bit different for students currently enrolled in those majors or minors.
2. Although for other purposes other than our POV statement, VR has already been implemented into other schools and universities for classes. According to Envision Experience.com, the University of ST. Thomas in St. Paul Minnesota has already implemented VR into their technology program, called STELAR. “STELAR designers and technicians help faculty members interact with the new technology and brainstorm on ways to take advantage of this resource” Their active learning classroom includes monitors and whiteboard on every wall, as of now, the area is mostly used for specific group projects that will benefit from this kind of environment.

Meanwhile across the states, Distance Education and Learning Technology applications or DELTA at NC State University is using virtual reality in introductory courses to biology, ecology, evolution and biodiversity. There has even been instances of vocational training centers using VR to help for job-specific technical training. “These programs generally focus on providing students with hands-on instruction and can lead to certification, a diploma or certificate. Vocational training will really begin to feel the impact of virtual and augmented reality over the next year or so.”

3. (n.d.). Retrieved March 19, 2018, from https://www.envisionexperience.com/blog/virtual-reality-vr-in-the-classroom

Education and Virtual Reality - How Are Schools Using VR today? (2017, October 25). Retrieved March 19, 2018, from https://www.viar360.com/blog/education-schools-using-virtual-reality/

Refine Innovative Solutions- (Austin)

Idea number 14 - VR within eye contacts

I chose this idea because if it was possible this would revolutionize the way we see Virtual Reality. If Virtual Reality was able to be within eye contacts, it would be so transportable. By being able to transport the technology easy it would decrease cost spent and would also all for designers to travel to the design site with the VR technology. To me eye contact VR would revolutionary to not only Virtual Reality but the entire world.

I believe this is innovative because it's never been done before and would allow for so many future technology related revolutions. This would allow people to engage in Virtual Reality without have to put on a bulky mask. This also would allow people to create things in a real space with no boundaries because you would be the sensor. If this kind of technology was possible it would change the world.

I believe making a prototype would be extremely difficult because this technology does not exist. This would take a lot of money and a lot of time to make but i believe if enough great minds worked on this, these could be created and pushed out to the public.

Through our refined innovative solutions we decided upon trying to focus on the education aspect of a program that would provide students the ability to view their creations in a First Person environment, causing our direction of the project to pivot leading us to a more viable and helpful solution. This would be a great method of engaging students with the software before they begin to use it in the field. Companies would be more inclined to make job offers to students who are already capable of using the widely used software within the construction industry. It would also be beneficial for them in understanding how the design build process works.

Thematic Identification & Composite

Theme Identification:

- VR will make things easier
- Visualizing ideas is currently difficult
- VR has the potential to be the new standard
- Assist in before, during and after of the design process

Composite Character Profile:

Name: Maxwell Stürm

Occupation: student

Major: architecture (minor in construction management)

Marital: single

Health: healthy

Age: 19

Hobbies: experiencing and using new technologies, video games, designing things using software

Loves: technology, innovation, computers, computer software.

Revised Problem Statement (POV):

College students currently enrolled in a major that involves a design process stage need an alternative hands-on learning environment because current design processes difficult for many students.

Transition between Thematic Identification and Infographics

Although engineering architects, like Maxwell Stürm, can understand the problem we are trying to solve and how we are doing it, people outside of that area most likely would not. So, we created an infographic to help convey the message.

Final Project Journal
Purdue University

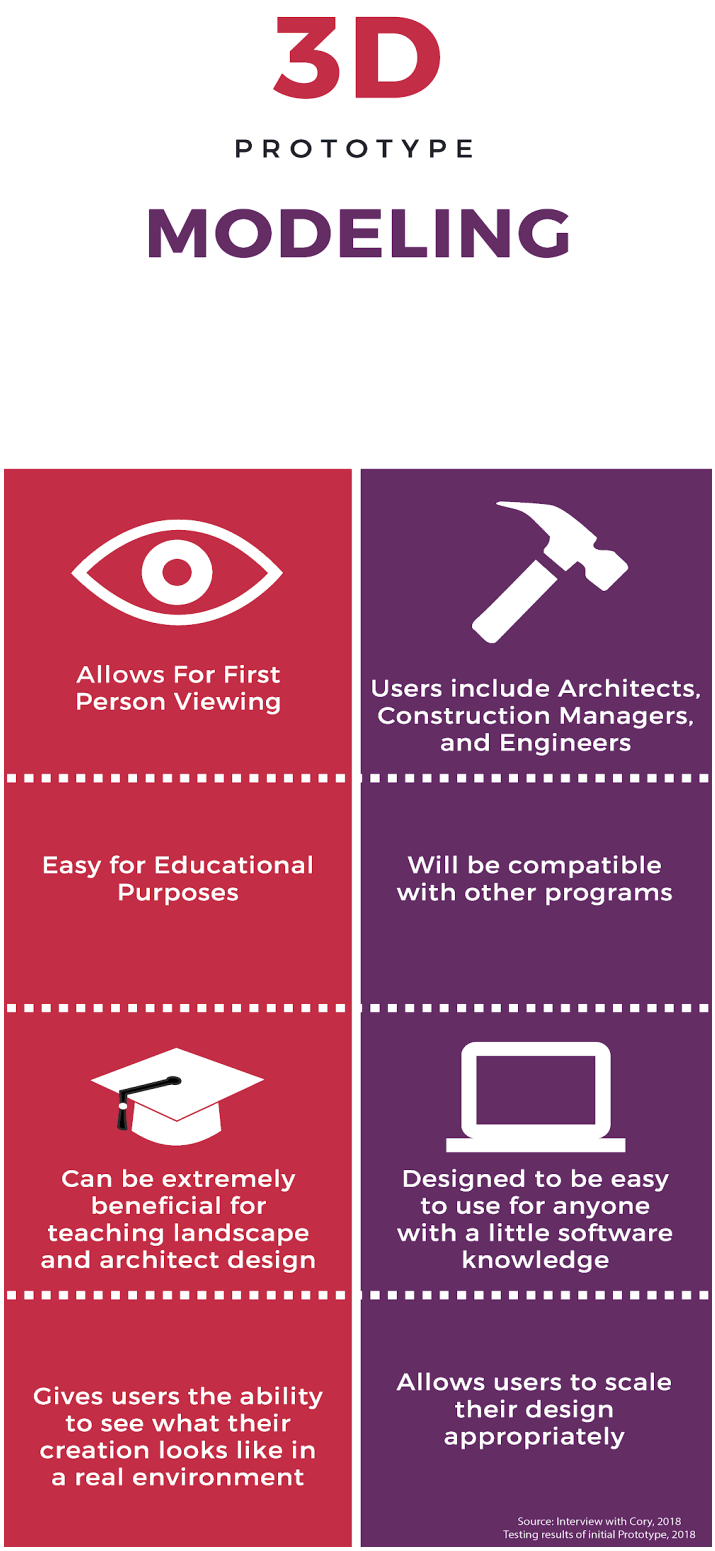
Introduction to Infographics

Infographics are used to help explain something in a simple format by focusing on the main ideas with data and images with limited text. In order for more people to understand what we are working on, the group made an infographic. To start off each group member made their own infographic and share it with the group. Then, we all decided which one will go on to be our final infographic with a few changes.

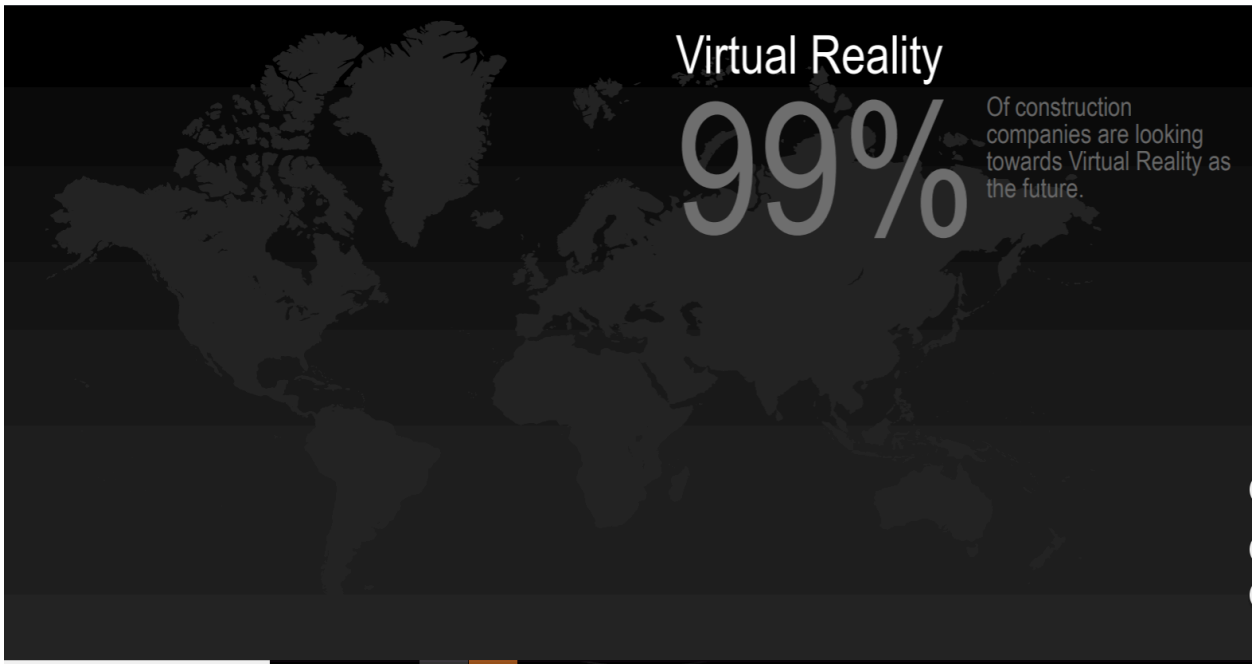
Infographic Ideas

Infographic- (Dylan)

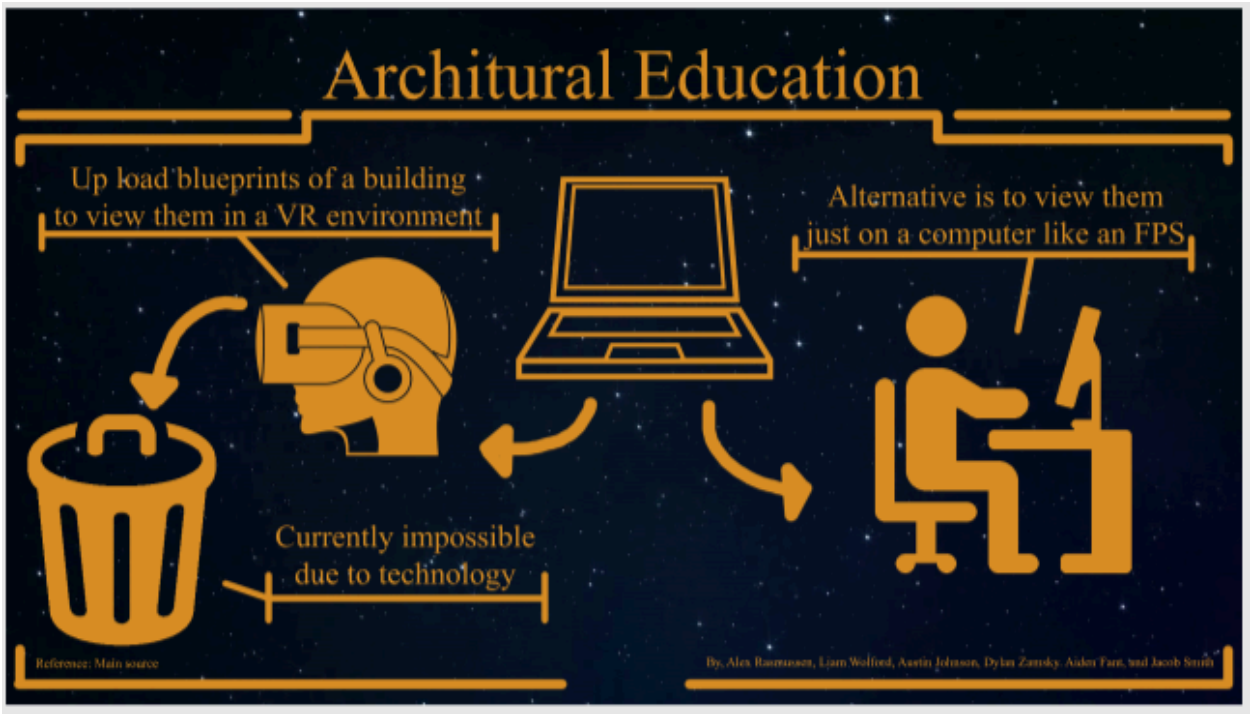
Infographic- (Austin)



Infographic- (Liam)



Infographic- (Alex)



Infographic- (Aidan)

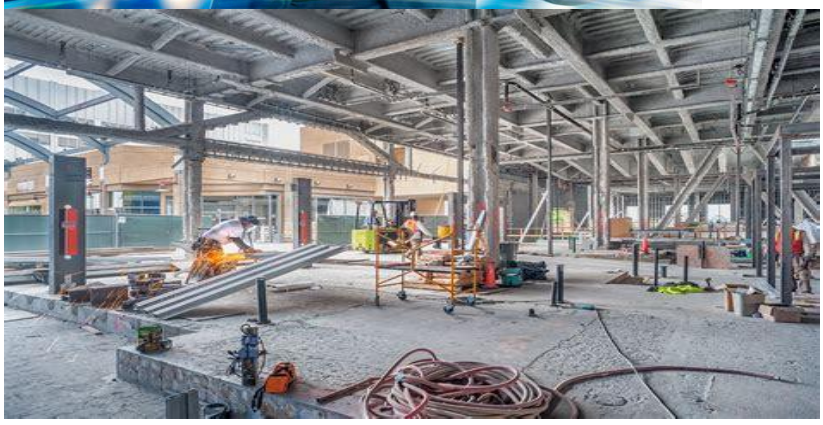
Infographic- (Jacob)

Jacob Smith

Virtual Reality In Construction

April 11, 2018

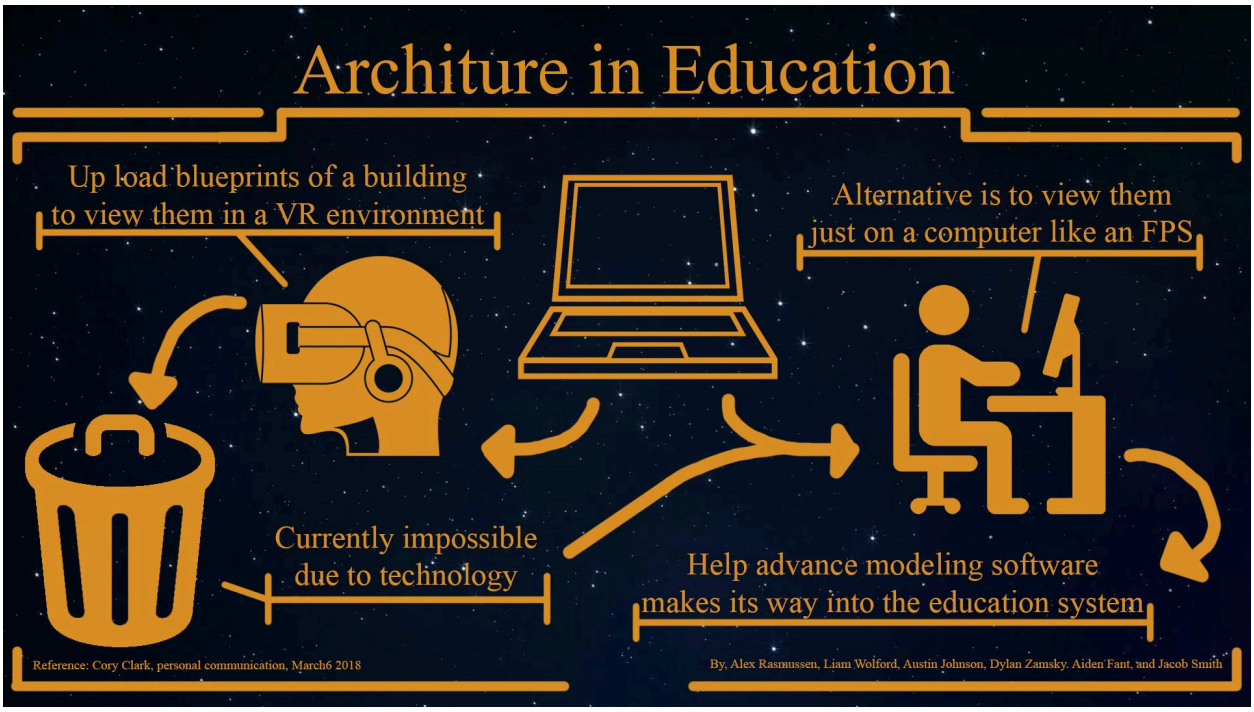
The user puts on the headset and is thrown into a new world.



This is the footage they see when using the headset.

Audience: The target audience that is targeted by this infographic are construction companies and schools. The construction companies will be able to use the software to help them with the design build process of construction. The schools will be able to use the product to train students how to use this software before they begin their careers.

Final Infographic



Next Steps

Moving forward, there are some things my group would like to do and continue doing. We plan to continue testing our current prototype and making iterations. Once we get our rough prototype all tested we plan to create high fidelity prototypes and begin the process of testing it and making iterations as well. After our product is done testing and ready to be built we would hire software engineers and begin to market our product to institutions with Architect, Engineering, and Construction Management majors. We plan to continue to test, update, and work on our product until it is completely satisfactory.

Conclusion

The software that we provide is a great way for students to begin their process of learning how to understand the design build process of construction. The software will offer a variety of views of the blueprints of a given construction project and will allow the user to edit the blueprints according to specifications required for the project. This software is targeted towards the educational field. The goal is for the software to be taught in schools so that when students reach the construction industry they will be ready to begin work with the widely used software. This will increase the productivity of students who start working at the start of their career.