High School Safety in Active Shooter Situations

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THESIS

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"Using design-thinking strategies, the purpose of this qualitative study is to explore ways to reduce loss of life during a high school active shooter situation focusing on the built environment."

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ABSTRACT

The past several decades have seen an increased amount of weapons in schools. Starting in 1999, America saw several active shooter events inside of school buildings. Just recently, 17 people died in a mass shooting at a high school in Florida. Thus, the goal of this qualitative study is to explore ways to reduce loss of life in an active shooter situation.

Interviews were conducted with eight individuals who had experience with high schools (i.e., principal, student, and teacher) or issues related to weapons and safety. Upon completion of the interviews, a design-thinking workshop was held with a similar group of individuals (n = 9) using experience diagramming, affinity clustering, statement starters, round robin, and schematic diagramming/discussion. The ideas generated from that session were taken into two expert interviews, with two leaders in the fields of safety and design.

The results of the study proved to be the status quo: classroom doors that lock, one controlled entrance to the building, increasing School Resource Officers (SROs), and the use of technology. That is to say, new ideas were not found. What this group provided were affirmations of findings already in the research.

Due to the status quo of the results, additional workshops were held with stakeholders not as close or familiar with the problem: six college students above the age of 18 and five diverse thinkers, ranging in backgrounds. Using the design-thinking strategies of concept mapping, alternate worlds, bull's-eye diagramming, and round robin yielded more fantastical results, including the use of non-toxic gas, secret escape tunnels, mazes, and lock downs triggered by gun shots. These ideas are in need of more work with people who can help make them a reality. While funding or realization of some of these ideas may be an issue, they provide a starting point to move discussions forward beyond the status quo.

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INTRODUCTION

Mass shootings in this country garner prolific media attention and school shootings are no different. The modern news era coverage of school shootings began in 1999 at Columbine High School ("CNN Library," 2017). Since Columbine, America has seen other school shootings, some featured more prominently than others. Usually, the mainstream media covers shootings with more deaths for a longer period as national debates intensify around the events. However, there have been over 240 school shootings in America since 2013 ("Everytown," n.d.). That is notable because that is when the Sandy Hook shooting occurred ("Everytown," n.d.).

As shootings have entered the mainstream media, people have started to search for answers about how to prevent school shootings. Ideas range from threat assessments, mentorship and relationship building between school staff and students, to focusing on the built environment (Doll, 2014). However, solutions are not easy and perhaps the most popular public outcry is gun control (Miller, 2016). Certainly, these solutions have a role to play in decreasing the number of school shootings, but they do not solve the problem of how to prevent loss of life in an active shooter situation.

Unfortunately, shootings come in all shapes and sizes. Mental illness is often present in these situations; however, a small percentage of gun violence is directly correlated with mental illness (Singh, 2016). It is important to note that any shooting or gun-related incident at any school is a cause for concern, not just the ones that make the mainstream news cycle. Preventing loss of life in all gun situations should be the goal.

Solutions have been sought around this topic since Columbine. Many commonalities exist in controlling access to the building, having mass messaging, and having an alert system (Lynch, 2017). This research is

seeking to take ideas and commonalities and develop solutions that minimize loss of life. When facing a problem, a wicked problem, where the intent is to kill innocent people in school environments, positing the importance of advancing solutions is the focus of this study. See Figure 1 below for some context on what the scene was on April 20, 1999 in the cafeteria at Columbine High School in Colorado.

Figure 1 – Columbine High School April 20, 1999

PURPOSE

Using design-thinking strategies, the purpose of this qualitative study is to explore ways to reduce loss of life during a high school active shooter situation, focusing on the built environment.

In an active shooter situation, there should not be loss of innocent life. The goal of this research study is to take ideas that are generated and pair those with new ideas. In order to do this, a diverse group of stakeholders will be called upon to complete different design-thinking activities individually and as a group. Stakeholders composed of students, administrators, counselors, teachers, law enforcement officials, architects, parents, designers, and gun owners encompass the diverse group.

DEFINITION OF TERMS

Affinity Clustering: Taking a data set and identifying similarities; grouping key data points together and labeling clusters that emerge; color-coding and subgroups help to identify clusters; helps to reveal common issues and patterns; and facilitates discussion.

Alternative Worlds: A way of borrowing, adapting, and looking at how different entities would solve a problem; challenges your investigation skills and forms new perspective.

Bull's-Eye Diagramming: A method of prioritization; helps a team achieve a consensus on ideas likelihood of effectiveness.

Concept Mapping: A way to organize concepts to achieve clarity; an effective way to solicit new information on a topic and understand an unfamiliar domain.

Experience Diagramming: Using research, you select an experience to document in detail; determine a format and then depict key people, places, and things to highlight in the diagram; illustrate the experiences and highlight key points in the journey; it will help to summarize a situation, deepen empathy, and document critical points of an experience.

Hard School Programs: Physical things that are present or taken away to help promote school safety.

Round Robin: Working in teams of three to four people, you make a worksheet folded into the same number of parts; each member must write down a solution to the overall team's problem; passing the sheet to the left, the team member will propose why that solution will fail; passing again, the next team member will solve for that critique; helps to think of new ideas for solutions and involves all team members.

Schematic Diagramming: A way of visualizing possible solutions; simplistic sketches of solutions are created and composed in a clear and clean way; helps to show proposed solutions, build functional details, and builds shared understanding of solutions.

Soft School Programs: Designed to promote safety without altering the built space with the addition or subtraction of physical items; meant to build systematic behaviors that promote safety.

SRO: Student Resource Officers; sometimes armed, sometimes unarmed; a tie to law enforcement, whether active or retired.

Statement Starter: Adding starters to the beginning of a problem; picking different starters for each problem and allowing a group to finish it with a different way of stating the problem; challenges assumptions, re-frames your perspective, and provides a direction to solve a problem.

LITERATURE REVIEW

Gun control is one of the most polarizing topics in our current media landscape. It was a hot button issue during the presidential election in the fall of 2016. As politicians, media members, television's talking heads, and citizens debate gun control, solutions to make our lives safer are an ongoing topic of discussion. The shooting in Las Vegas on October 1, 2017 was yet another incident to spark major gun control debate. However, infamous events in educational settings often spark the same debate: Columbine, Virginia Tech, and Sandy Hook. As the weeks move on from Las Vegas, we as a society find the gun control debate fading quickly from the headlines again.

Columbine, Virginia Tech, Sandy Hook, MS Douglas: names of places that changed forever, due to an unthinkable event. April 20, 1999 in Littleton, Colorado, two boys murdered 13 people and then killed themselves at Columbine High School (Calefati, 2009). The events that day started a plethora of research into answering the question of why (Calefati, 2009). Why are we continually seeing repeated acts of gun violence in high school settings (Doll, 2014)? Seventy-five percent of people who have carried out an act of violence were bullied and 61% were motivated by revenge (Doll, 2014). Although only three of the more well-known school shootings were previously listed, hundreds of incidents of gun violence in schools are reported each year (Hefling, 2014).

Common themes always emerge regarding blame: bad parenting, access to weapons, bullying, value of life, violent video games, and our country's mental health system come to the forefront (Hefling, 2014). All of these, undoubtedly, have some role to play; perhaps there are even more issues to add to that list. However, as Ronald Stephens, executive director of the National School Safety Center, said, "I think that's one of the major problems. The answers are not easy to find. A line I often use is do everything you can, knowing you can't do everything" (Hefling, 2014, para 4). A common theme also emerges for

what can help prevention, and school culture (Calefati, 2009). The emphasis we have seen on preventing bullying over the last decade is not a coincidence (Schuster, 2009).

Since Columbine, school safety has improved. Yet, increasing physical security such as metal detectors is not always the most effective option. Administrators often point to dealing with bullying, the lack of a respectful environment, and not neglecting student despair as viable solutions. Post Columbine, the debut of "hard" programs to help with safety were prevalent. More recently, schools have begun to use "soft" programs. Soft programs promote conflict resolution, anti-bullying, anger management, and emotional intelligence, versus the hard programs (e.g., metal detectors, arming teachers), which tend to isolate students. A few school culture solutions rise to the top, a school wide foundation for well-being and success of all students, a system of identifying students with behavior problems, and a system for providing interventions and solutions for at-risk students (Wilde, 2016).

The design of physical school space plays a role in the learning process, community involvement, building of culture, and safety (Larson Vaughan, 2017). Issues that designers have to contend with now include, but are not limited to, accessibility, aesthetics, cost, functionality, historical status, safety, and sustainability (Larson Vaughan, 2017). Designing safer schools is becoming a main concern for architects. Some factors that help make school spaces safer are locking barriers between large meetings spaces (i.e., the gym) and classroom space, the use of windows that cannot be reached, clear corridors, wide large hallways, single stall restrooms, and moving lockers or abolishing them all together (Craven, 2016). Access points are another important factor in school safety, especially controlling the number of entrances, providing a separate staff entrance, having bus only lanes, providing ample lighting outside, minimizing outdoor hiding spots, and using emergency alert systems (Craven, 2016). The goal of all of these aspects of a designed physical school space is to have students feel more invested in their school community and improve student engagement (Zubrzycki, 2013).

Minimizing loss of life in active shooter situations is an achievable goal; looking at past events, focusing on the causes of those events, and looking at solutions that have been implemented will be factors in doing so. It is important to understand what has caused the need for guns on school properties (Doll, 2014). The solutions since Columbine are wide ranging, and continuing to adapt and push that progress forward is important for minimizing loss of life. The design of the built space must incorporate many factors, but safety is one of the most important. In addition, the design of schools affects culture and community engagement, while having a direct correlation to learners' attitudes and violence statistics (Zubrzycki, 2013).

The social environment in a school plays a large role in students' success inside of the classroom and how they feel outside of it. As the decades have passed since Columbine, designers and architects have played a more critical role in how to make the school environment safe. Designing a school to be safe and making it the best environment to learn in is a difficult balance. When designing a school in this modern era, designers try to make visitors visible as they approach, control access to the building, use landscaping as help to control movement, incorporate vestibules, reinforce doors and windows with bullet proof glass, have wide open hallways that can be electronically sealed off, and clearly number rooms for first responders (Levenson, 2018). It has also been common to see the use of keycard entry, video surveillance, building lockdowns with the push of one button, and expanded budgets to help with school safety (Hobbs, 2018).

It is widely believed that hardening our schools is not the answer to the problem of how to stop school shootings. In looking at this problem of saving lives in an active shooter situation, we must understand how students experience schools and the meaning it has in young people's lives in America. As a student, you spend 6 to 7 hours a day for 180 days out of the year in school. It is time to ask deeper questions about why this is happening in schools and seek out an educational answer. Oftentimes the

perpetrator is trying to express him or herself, lash out, and/or have his/her side of the story told (Warnick, 2018).

Guns are a problem in our country and are not isolated to schools. The cases we see of mass shootings in schools are not impulsive acts of violence (Beres, 2018). Someone has noticed troubling warning signs, erratic behavior, or may even know an attack is imminent (Beres, 2018). At MS Douglas, the shooter had several red flags in his past, had been expelled, reported to law enforcement, and was mentally ill (Berman, Merle, & Rozsa, 2018). However, gun violence is a unique problem because of its political nature in America. Background checks, permit requirements, and bans on the most dangerous weapons are something both sides of the aisle should be working on (Murphy, 2017). It was said best by the author of a study examining gun violence, Antonis Katsiyannis, that "deliberate and sensible policy and legislative actions, such as expanded background checks and a ban on assault weapons, along with expanded support to address mental health issues among adolescent students and adults and other related preventative measures will likely reduce the occurrence of such events in the future" (Beres, 2018, p. 1).

We have seen some movement by the government to help with gun violence. Legislation has been changed to increase funding in order to study and research gun violence (Ajilore, Gangopadhyaya, & Obermark, 2018). In addition, gathering consistent data to clearly outline parameters is now being mandated (Ajilore et al., 2018). Also, government organizations are trying to make sure that community-based programs designed to reduce gun violence are well funded and have resources to sustain themselves (Ajilore et al., 2018).

The response to an active shooter situation has evolved over the last few decades. Lockdowns play a pivotal role in how a school responds to an active shooter situation. It is important to have buy-in from faculty, staff, students, and parents to constantly practice lockdown situations. In a remote part of

California in 2017, a lockdown saved countless young lives. A school secretary heard gunshots in the area and immediately reacted by placing the school on lockdown. Within the next minute, the shooter was trying to enter the school, but since the school was on lockdown, he could not enter. That did not stop him from firing bullets at the school for nearly 6 minutes. Eventually he became frustrated and moved on, killing several others in the community before he was killed by police. This is a great example of why lockdown drills must happen in the modern day and how they can save lives (Berman, Silverman, & Svrluga, 2017).

The newest response to an active shooter is “run, hide, fight.” Run, hide, fight is a generally accepted response and has become a program adopted by thousands of schools and businesses across the country (Bowden, 2018). However, some experts continuously remind people if you find yourself in an active shooter situation, your best option is to run; it is hard to hit a moving target (Bowden, 2018).

Technology is a common response to how we can solve this problem. But how? PikMyKid is an app that is creating many different types of solutions using technology. The app has a panic feature, which can trigger a lockdown and alert law enforcement, while sending them real-time audio of what is happening in the building. The app is also creating a place for schools to digitally have their blueprints on the app; however, this feature is not cheap. The app and some other companies are also exploring how shot detection technology, similar to that used in major U.S. cities, could function on this app to automatically trigger a lockdown scenario. It is believed that in the next 10-15 years artificial intelligence can begin to play a role in identifying a school shooter before that person could cause harm to a community (Bell, 2017).

The social and built environment are intertwined in solving this problem. Twenty percent of all high school students reported being bullied on school property (Maddox, 2018). It is known that bullying occurs in places that are out of sight from school administrators (Maddox, 2018). School design, to

combat bullying, is answering with transparency, open-air stairwells, and wide-open common spaces, free of nooks and hiding places (Maddox, 2018). Bathrooms must be completely rethought in order to solve this problem. Having full-length single stalls and handwashing stations with glass that look out onto the hallway are helpful (Maddox, 2018). Creating transparency and learning corridors that allow for collaboration make for safer space and also a more engaged and meaningful learning space(Maddox, 2018). Another design feature of schools that has been called on to increase student success and lower violence and mental issues is a “green wall,” “living wall,” or “vertical garden” (Martin, McCullough, & Sajady, 2018). It helps to connect students to the outside environment and increases test scores, learning outcomes, and project-based collaborative learning, and leads to decreased criminal behavior and student misconduct (Martin et al., 2018). Biophilic learning is the act of connecting students with the outside world, whether it be by bringing nature inside (as mentioned above) or allowing more views of the outside from the built environment (Flores & Lewis, 2018). The addition of trees and shrubs to the outside environment, with increased natural light and ventilation, can also enhance student learning outcomes (Mcilroy, 2018). The exposure to nature can also lead to lower levels of stress and anxiety, as well as decreased levels of mental issues (Flores & Lewis, 2018).

Guns are an important topic in today’s American society. Looking at past active shooter incidents in schools can provide context and clues for future solutions. Themes have emerged as to why these events happen. Through the emerging themes, we have found places to look for solutions. The design of school buildings plays a critical role in the safety of students, but also in the psychology of community building. In looking at all of these factors, using design-thinking strategies, ways to minimize loss of life in active shooter situations will be found.

METHODS

SAMPLE

This study began with three main parts. First was the development of a diverse stakeholder group (see Figure 2). Key members for this study included students, principals, counselors, parents, someone familiar with weapons, law enforcement staff, and a designer. The group was comprised of stakeholders throughout the Western New York region. The participants were selected to ensure diversity of thought through a mix of private and public schools, different design firms, and different branches of law enforcement.

The purposive sample consisted of participants high school-aged through 30+-year-old professionals in their field, which offered a unique perspective in terms of using different technologies and views to solve this problem. Diversity in gender, as well as people from all ethnicities, were considered. Since the group needed to gather, availability and region contributed to the final group selection.

After collecting data from the diverse group and expert interviewees, it was determined that two more groups were needed (see Figure 3). The second round of workshops was to include people less familiar with the actual problem. Utilizing six students, age 18 or above, comprised one design-thinking workshop. The second workshop set out to find stakeholders who could offer more unique and innovative solutions. The sample is labeled change-makers.

This purposive sample led to a second diverse group of stakeholders, less familiar with the problem. Diversity in gender, as well as people from all ethnicities were considered. Since the group needed to gather, availability and region contributed to the final group selection. The student group was gathered from St. Bonaventure University and consisted of students who were from the Northeast region of the United States.

Session One	Diverse Group	Expert Interviews
Stakeholders included	Principal Head of school Student Parent Designer Law enforcement official School counselor Current teacher Facilities expert	Designer School Safety Specialist

Figure 2 – Subjects

Session Two	Student Group	Change-Maker Group
Second Round of Sessions	College Students ranging from freshman to seniors (n=6)	Musician Bartender Escape Room Designer/Attendant Scientist Entrepreneur/Escape Room Advisor

Figure 3 – Subjects Second Round

INSTRUMENT

Session One: The process began with individual interviews with all group participants (see appendix B). The interview informed the researcher of the participants' experience, comfort level, and ideas regarding active shooter situations. Upon completion of the interviews, the group convened for a design-thinking workshop to develop experience diagrams and affinity clustering.

After a 5-minute break, the group reframed the question from the themes developed via affinity clustering using statement starters that informed the second part of the workshop. The round robin design-thinking strategy was used to generate innovative solutions to the problem. The workshop concluded with a focused discussion to re-cap and participants developed schematic diagrams for final

solutions. The design of these strategies helped to identify and understand the problem, and helped the diverse group develop solutions to minimize loss of life in an active shooter situation.

Once the design-thinking workshop was completed, expert interviews were conducted with an architect from Cannon Design Group, a top design firm in the Northeast, and a school safety expert from Cattaraugus County.

Session Two: Upon completion of session one of data collection, it was determined that more data needed to be gathered. The development of two new groups (see Figure 2) to complete session two of workshops happened next.

The workshop with students consisted of concept mapping, round robin, and alternative worlds. The workshop with change-makers used concept mapping, alternative worlds, bull's-eye diagramming, and round robin. These activities were selected to help these groups gain familiarity with the problem, shape a solution in a different context, and then use discussions and ideas that had been generated to formulate more practical solutions.

PROCEDURE

Session One: Emails were sent to individuals in Western New York who met the criteria to participate in this research study (i.e., high school, weapons, safety, and/or design experience) (see Appendix A). Individual interviews were conducted with those who met the study criteria and agreed to participate. Each interview lasted 20 to 30 minutes using the open-ended questions developed by the principal investigator (see Appendix B).

Once the interviews were completed, a design-thinking workshop was held that included the following strategies: experience diagramming (see Appendix C), affinity clustering (see Appendix D), statement

starters (see Appendix E), round robin (see Appendix F), and schematic diagramming (see Appendix G). The session was one hour long and completed at St. Bonaventure University.

The final data collection method for the first session included individual interviews with an architect at Cannon Design group in Grand Island, NY and a safety expert from Cattaraugus County at St. Bonaventure University.

Session Two: It was then determined that session two of workshops would need to be completed. Two rounds of emails were completed, one to students and one to the change-maker group (see Appendix A). The emails detailed what would be expected of participants along with a brief introduction to the topic.

The student group began with the concept mapping exercise (see Appendix I). The discussions that were completed during concept mapping were a good segue to the alternative worlds exercise (see Appendix J). The final activity was a round robin exercise (see Appendix F). The workshop was conducted at St. Bonaventure University and lasted about an hour.

The change-maker group began with a concept mapping exercise as well (see Appendix I). From there we moved to an alternative worlds exercise (see Appendix J). After, we completed the bull's-eye diagram (see Appendix K) and round robin (see Appendix F). The workshop was completed at St. Bonaventure University and lasted for just over an hour. The change-maker group workshop did take ideas generated from the student group to use during the bull's-eye diagramming.

INTERNAL VALIDITY AND LIMITATIONS

The success of this study was defined in the early stages. The development of a diverse group was a factor in the success of this study. One limitation was the scheduling portion of the workshop. Keeping

the group diverse but concise was difficult. The group consisted of people close to the problem. As it turned out, this produced solutions that were already available through research and status quo.

Because the results from session one did not expand the body of knowledge nor lead to innovative solutions, a more diverse group with less exposure to the problem was found. Furthermore, a group termed change-makers derived from creative fields was added. Workshops were run to help participants think more fantastically and find solutions that were not already implemented. Although implementation and costs are still challenges, solutions that are more outside of the box were generated with session two.

RESULTS

PARTICIPANTS

Session One: Interviews were conducted with the following stakeholders leading up to the design-thinking workshop:

Parent

President of Archbishop Walsh Academy (private high school)

School Counselor at Archbishop Walsh Academy (private high school)

Director of Facilities at St. Bonaventure University & Board of Education Member in Hinsdale, NY

Student (upperclassman at St. Bonaventure)

Associate Director of Facilities at St. Bonaventure University & former Construction Manager at a local school district

Principal at Bradford Area High School (public high school)

Director of Safety and Security at St. Bonaventure University & retired New York State Trooper

Due to scheduling, not all of the above participants could make it to the design-thinking workshop. In order to keep the group diverse and at the right size, the following participants were added:

Literacy Coach at Allegany-Limestone Central Schools (public school)

Teacher at Archbishop Walsh Academy (private high school)

Student (first semester freshman at St. Bonaventure University)

School Counselor at Portville High School (public high school)

After these pre-workshop interviews and the design-thinking workshop, two expert interviews were conducted:

Director of Emergency Management Services for Cattaraugus County

Designer at Cannon Design

Session Two: Once it was decided that more information needed to be gathered, two more workshops were run. The following stakeholders comprised the groups:

Six St. Bonaventure University Students ranging from 18-21 years in age

Musician

Scientist

Escape room designer/attendant

Bartender

Entrepreneur/Escape room Advisor

INTERVIEWS (SESSION ONE)

The interviews were conducted in person, with one conducted on the phone. The interviews were helpful in determining how much the stakeholders already knew, finding key themes, and hearing solutions. All terms for our affinity clustering activity were gleaned from the interviews.

The term discussed most in the interviews was “technology.” Utilizing technology to help find a solution was something every participant mentioned. The ability to lock down buildings remotely, or with one click of a button, is important, and we are seeing this technology introduced to the marketplace. Another technological use that we have not seen as much in high schools is key card access. These systems can be more expensive to implement.

In speaking with the counselors and principals, it became clear that training and drills are important. The facilities and law enforcement stakeholders echoed those sentiments too. Mandatory training is necessary, and getting staff, students, and parents on board is a must. From a student perspective, “communication” during the drills is most important.

School administrators and law enforcement also reiterated the theme of communication. Sharing emergency plans in the event of an active shooter situation allows first responders to access the plan, examine it, and understand how people inside the building are reacting.

Student resource officers (SRO) were another topic that was extremely common amongst all interviewees. Increasing the number of SROs, or getting one, was a dream of all administrators. If they

were presented with an unlimited budget, they would make sure they had at least one SRO and would increase the number of cameras in their building. However, an issue with cameras is having the staff to monitor them on the back end.

Another common theme included “one entrance with multiple exits.” It has become apparent that monitoring the entrance and limiting access is critical to helping solve this problem; however, it is necessary to have multiple ways to exit a building. The president of Archbishop Walsh Academy brought a unique perspective to this topic, as he was working for the district next door to Sandy Hook when that tragedy took place. He discussed having to answer tough questions from parents about what the next steps would be.

The president also spoke to the cause of school shootings: mental illness, gun control, revenge/vendetta, and the media. Another principal offered a unique perspective on the gun issue, mentioning that living in a rural area of Pennsylvania creates challenges when it comes to firearms. Most families in the area hunt; however, when I pressed him on whether this was good or bad, he actually said, “I believe it has made our families more aware of the need to safely store their guns.”

Doors once inside the building become very important. How a door can keep people out or keep people in is critical for not only safety situations, but also when it pertains to fire code. Archbishop Walsh Academy did not have doors that could be locked from the inside as of 3 years ago. Adding simple safety features that can save lives is necessary, but for administrators, it has to be balanced with the budget. Windows on doors are a strongly debated point because of the size and vantage point that it would allow for an intruder. Windows can also allow access, by either breaking the glass and unlocking the door, or by breaking the glass and shooting in.

The interviews were vital in developing common themes. The president summed it up best when he said, “We are completing these drills to practice and buy time for the Calvary to arrive.” After

completing these interviews, it is easy to see that this problem is prevalent and on the minds of all the different stakeholders that make up our education systems.

EXPERIENCE DIAGRAM (SESSION ONE)

Based on the interviews conducted, it was clear to see what people thought would be important to focus on during the experience diagram: the shooter, staff/teachers, students, and first responders. As a group, we examined places, people, things, and critical waypoints that those four groups would encounter (see Figure 4).

It was apparent to us that the shooter would be looking for larger areas where extensive damage could be done, such as hallways, gyms, and libraries. The shooter would be looking for victims, and in some instances, may have a vendetta he/she is trying to carry out against a specific person. Entry is something that could be easy for a current student carrying a backpack, but difficult for a suspicious looking person. The shooter could also encounter locked doors, the SRO, or other types of resistance.

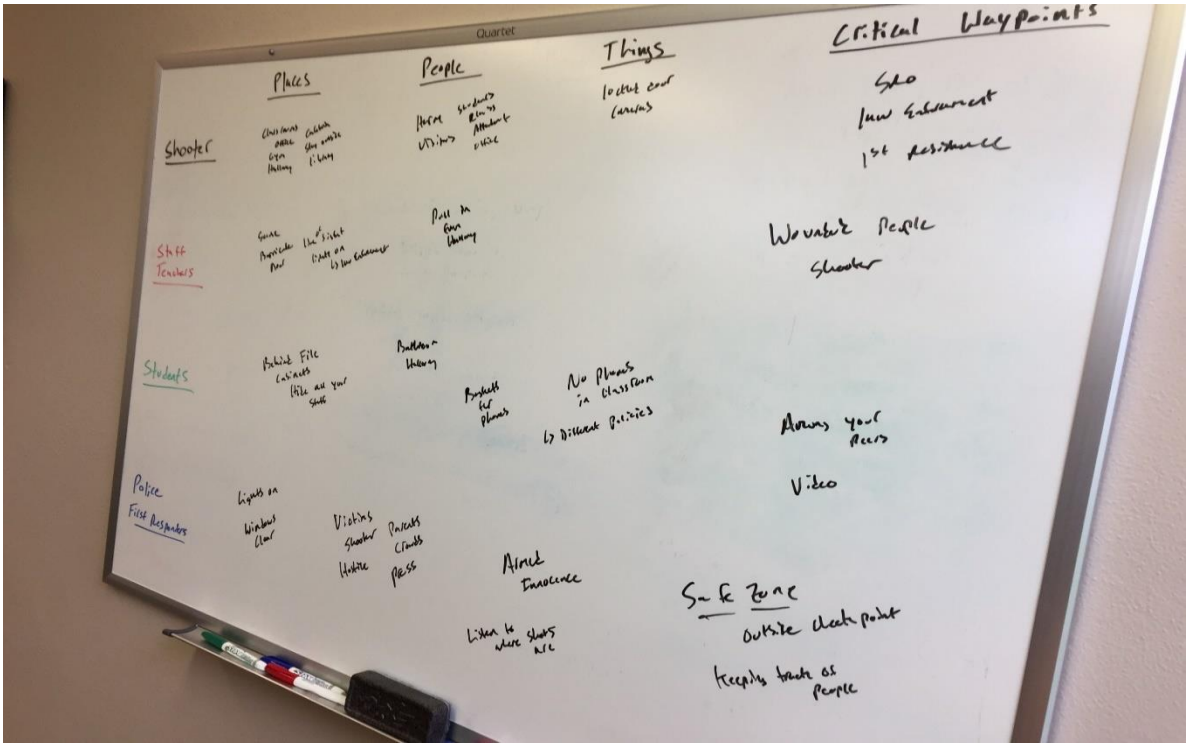

Figure 4 – Experience Diagram

Teachers and staff could easily be in the same space as the shooter. They would be trying to establish line of sight and pull in students that may be straggling in the hallway. This group could encounter an area with or without the shooter. If they are without the shooter, it should be a shelter in place or fleeing scenario. If the shooter is encountered, a decision would have to be made quickly. Running is the best option in this case. The other potential people they may come across are first responders or wounded victims.

Students may try to hide in their classrooms. It is important for the door to be locked and for them to make it seem as if nobody is in the room. We talked about many different topics when speaking about how a student would experience this event. Much centered around cell phones. During the Parkland event, videos emerged of students in the classroom while the shooter was still inside. How a school handles cell phones becomes important because it can directly lead to what information is being shared by the media. Some in our design-thinking workshop mentioned that they have seen schools have baskets where all cell phones are kept during class. The cell phone policy at an individual school will be critical to how students react.

As first responders arrive, they look for different signals as they approach the building. It may be lights on or signals in the windows, and they would look at the school's plan to see how people may be sheltering inside the building. First responders deal with many people, including victims, the shooter, parents, press, and potential crowds. In Parkland, the shooter made it off school grounds before being apprehended because he disguised himself in the crowds of people escaping the building. The establishment of a safe zone is something that first responders would create upon entering the building, while also getting a checkpoint outside of the building, which are tactics that help find the shooter and save lives.

The experience diagram allowed us to understand different points of view throughout an active shooter situation. Individually, we often understand those already, but to get the group in the correct mindset, this activity was valuable.

AFFINITY CLUSTERING (SESSION ONE)

Identifying issues, revealing themes, and facilitating productive discussion are products of affinity clustering. The conversation that the group had for the last 2 minutes and 30 seconds of our affinity clustering was some of the most important during the entire session (see figures 5-14). I developed the terms based upon the pre-session interviews conducted. The group was then asked to cluster the terms together and label the clusters they created.

The participants created the following clusters: infrastructure, causes and effects, responses, preparation, responders, and people involved. The group struggled to find a place for a few of the terms left on the table, which created meaningful conversation. As they tried to place the last few terms into categories they had conversations about why and how regarding the entire process.

“Cost,” “gun control,” “gun,” “communication,” and “soft target” were the terms that the group had a hard time getting into a cluster. These broad terms seem to play a multi-faceted role in this problem. The group focused in on guns and the role they play in keeping people safe. The conversation also focused on cost and how monies should be distributed. It is apparent that the rural setting that this session was conducted in played a role. The term “soft target” led to a greater discussion about other soft targets (e.g., churches, sporting events, plazas) and how to make them safer. As one participant stated, “we can make these hard targets, but it won’t feel like a school anymore.”

This activity showed the greater categories that make up the problem(s) that lead to active shooter situations and how we systematically respond. The conversations about bullying and social media being

main causes as to what leads to an active shooter situation were prevalent. The acceptance of drills, procedures, and emergency manuals into the everyday vocabulary of high school life is alarming, yet necessary. The conversation created here set up the ability to effectively run the last two activities of this session.

Figure 5 – Affinity Clustering Before

Figure 6 – Affinity Clustering in action 1

Figure 7 – Affinity Clustering in action 2

Figure 8 – Affinity Clustering in action 3

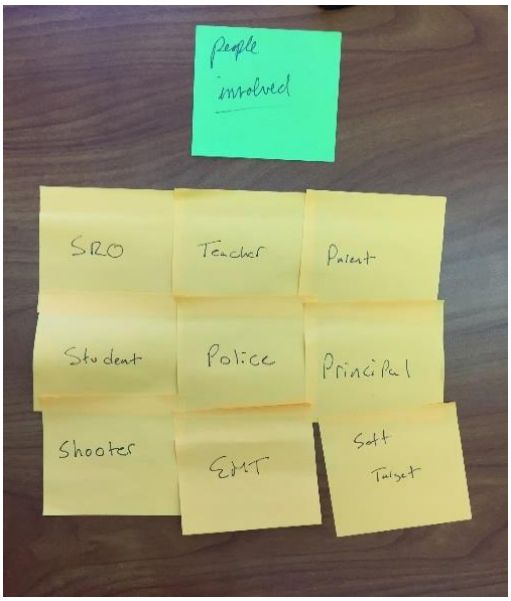

Figure 9 – Clustering Involved

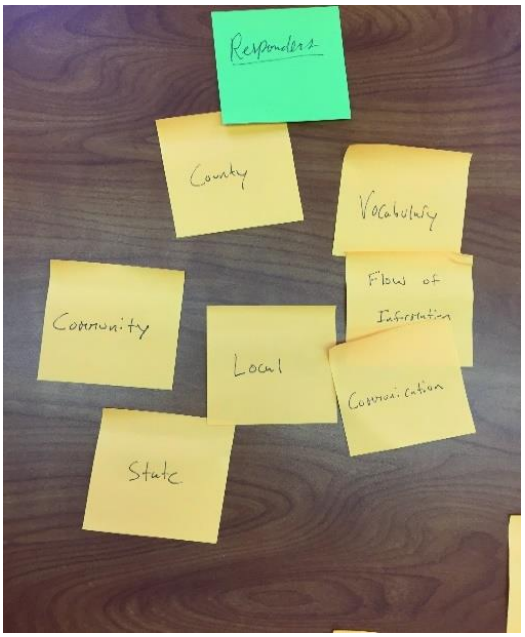

Figure 10 – Clustering Responders

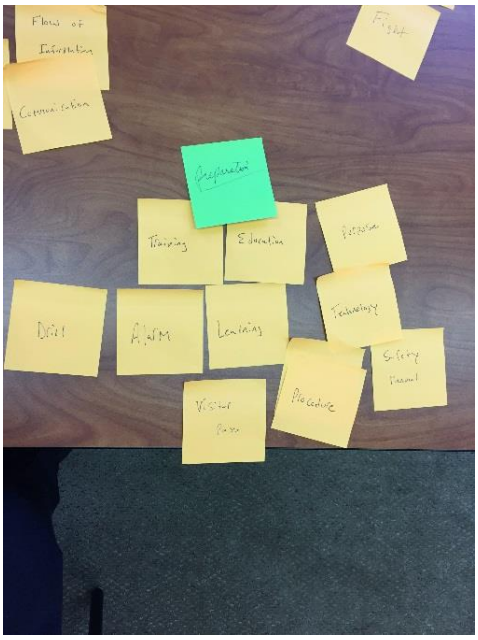

Figure 11 – Clustering Preparation

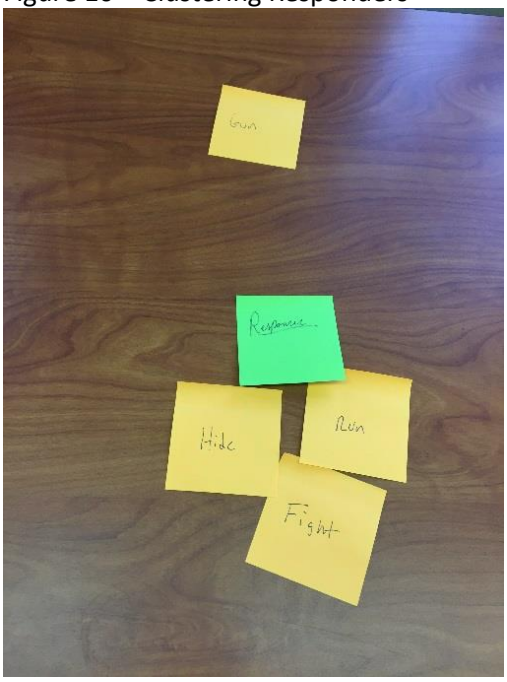

Figure 12 – Clustering Responses

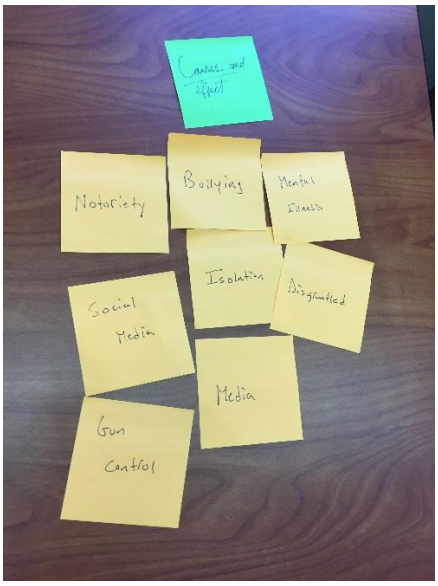

Figure 13 – Clustering Cause & Effect

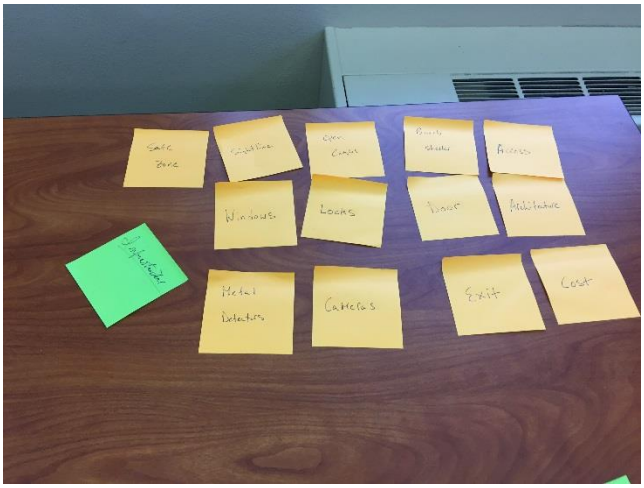

Figure 14 – Clustering Infrastructure

STATEMENT STARTERS (SESSION ONE)

As the other activities finished, themes from the interview and earlier in the session had clearly emerged. Using these themes, the researcher developed statement starters that provided different insights and formed questions. Five different statement starters were developed:

1) How might we use technology to help prevent loss of life in an active shooter situation?
2) In what way does gun control contribute to our problem?
3) How can cameras and SROs help keep schools safer?
4) In what ways might we use different design/architecture to prevent loss of life?
5) How do we incorporate windows and single entrances into safer building design? (see Figure 15)

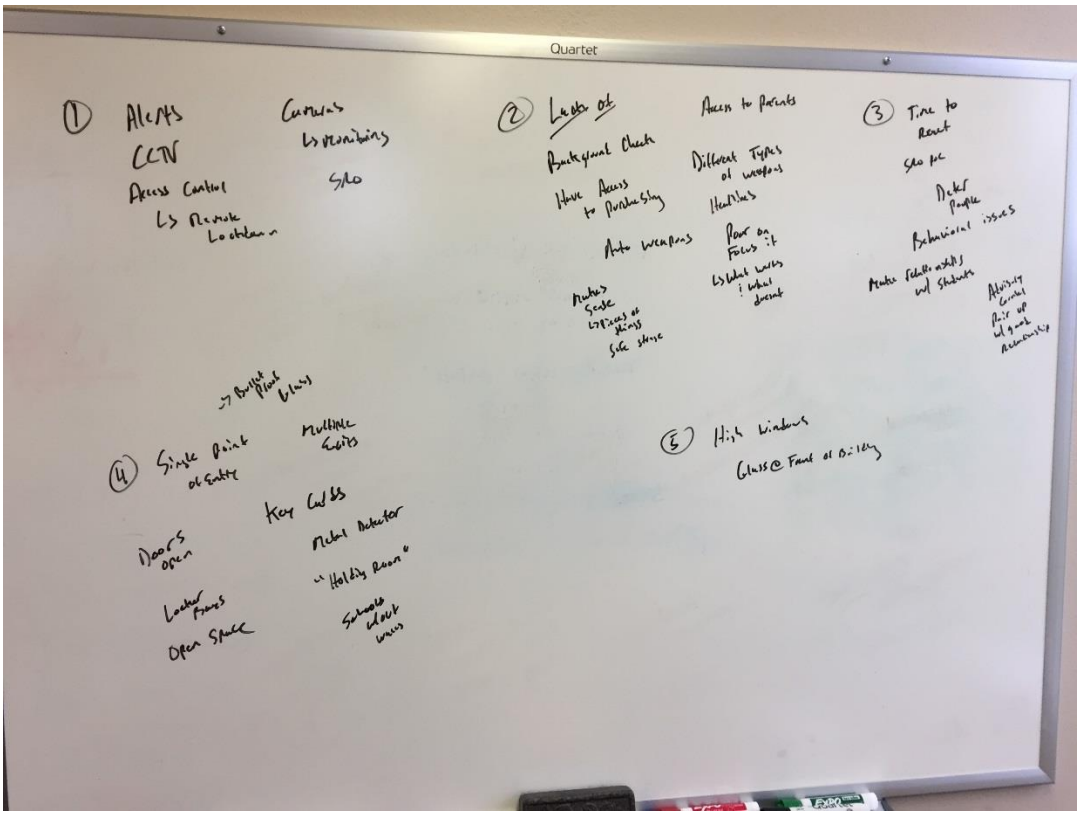

Figure 15 – Statement Starter Answers

For the first statement starter, participants generated standard ways to use technology as we talked about the use of mass alert/messaging systems, closed circuit television cameras, and even SROs. However, we also spoke about access control and being able to do so from anywhere. The ability to lock down a building, or parts of it, with the click of a button from any location, inside the school or at a precinct.

“Lack of gun control” was the first statement I heard in response to this proposition. In this portion, mostly because of the way the statement was presented, the group spoke about the types of weapons being used in these attacks. The Las Vegas shooting, where a bump stock was used, was discussed. The group spoke about the need for training, access to weapons, and background checks, specifically their role in obtaining firearms.

Cameras can hopefully make reaction times quicker. The conversation here centered on SROs and the development of relationships they have with students. All of the research points to shooters exhibiting warning signs at some point. Having extra adult eyes in the building may lead to quicker identification of students who are struggling. Participants also mentioned mentoring programs that can even be student to student, or adult to a group of students, which would serve as a checks and balances for how high school students are doing.

These statements and questions were asked without regard to budget; in fact, it was said, “do not let budget influence how you answer these questions.” Thus, it is not surprising that bulletproof glass was a design feature the group wanted. Single point of entry, but finding multiple ways to exit, was another request. If in fact doors are being propped open or left unlocked, usually human error is to blame. The removal of locker bays, implementation of key card access, and a vestibule or holding room to enter were discussed as well.

Participants suggested high windows; however, that does present its own challenges in the design process. The limitations of glass at the front of the building is a good idea in theory, yet it points us to larger questions related to what these buildings are designed for: to be the safest structure possible or to incorporate the best ways for students to learn?

The statement starters helped provide direction for our problem solving, which transitioned to the round robin activity. It started to generate practical ways we could solve this problem, especially if we had an unlimited budget.

ROUND ROBIN (SESSION ONE)

The round robin activity is a culmination of the entire workshop. It was fascinating to see the ideas that were brainstormed by the group, critiqued and solved. It generated some potential solutions for pitfalls that I am sure school districts across the country experience, but are especially prevalent in rural

communities. With every idea on the table, it was interesting to see what the group produced (see Figures 16-18).

A single point of entry, armed SRO, and enhanced patrolling in the building were quickly negated with too much cost. However, the thought of raising a tax and communicating with community stakeholders the effectiveness of these programs could be a potential solution. Several ideas to this problem involved "hardening schools," which was met with discussion and a focus back on the mission of our educational facilities.

It became clear that monitoring of doors and access points is critical. Using technology, ID scans or notifications, may help alleviate doors propped open. In addition, training and the removal of human error in leaving doors propped open is important to this process. The idea of having bulletproof vests in each classroom was also proposed. It can be hard to make that a reality, but perhaps the hardening of certain areas of a school would be appropriate.

Figure 16 – Round Robin 1

Figure 17 – Round Robin 2

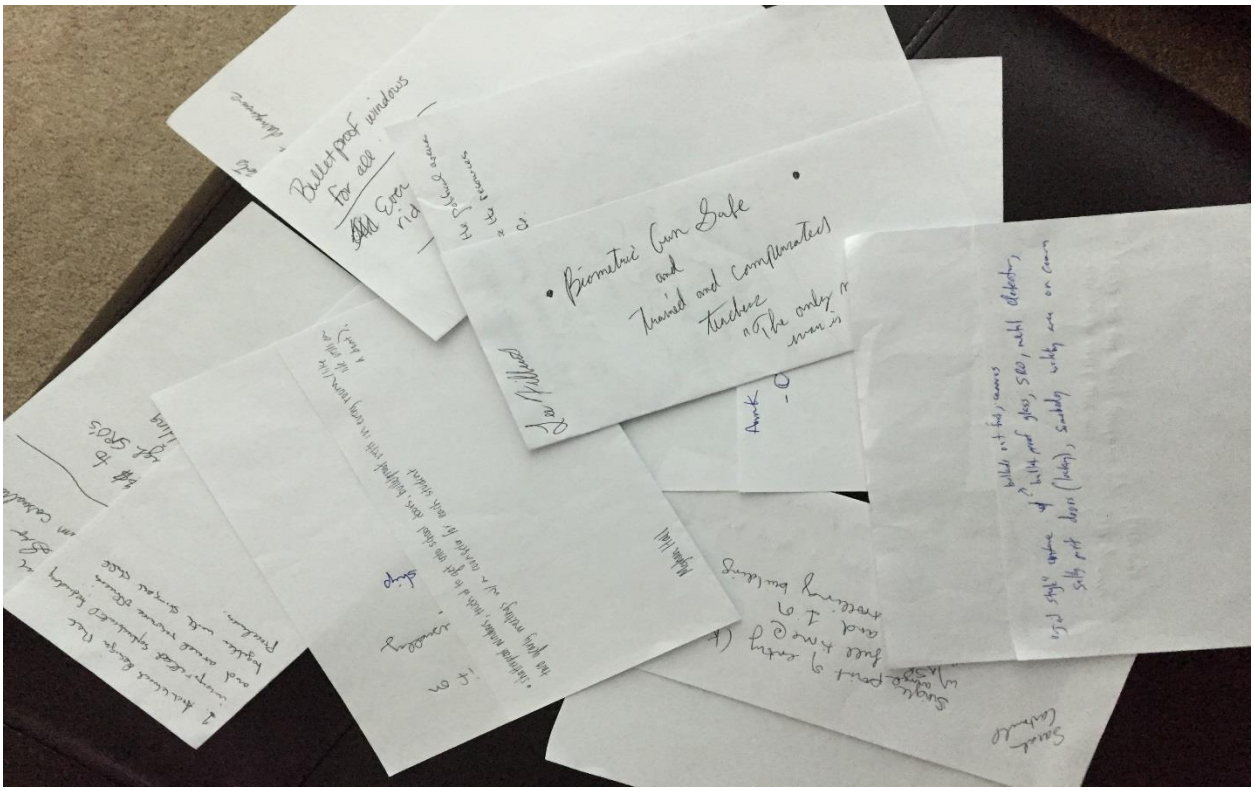

Figure 18 – Round Robin Session One Collection

The relationship and mental well-being of students was a constant focus. The development of check-ins or mentorship programs that keep an eye on students and their well-being would help this problem.

Reallocating resources was another common theme. It is hard to imagine in an era where teachers are already underpaid, where those resources could come from.

The last two ideas from this activity present interesting points. One idea was looking at biometric gun safes, or as we talked about in a few discussions through the workshop, technology that is used in major cities to alert authorities and trigger a lockdown when a gunshot is heard. We saw this in California, featured in the literature review, only it was a human that heard the gunshot and immediately triggered a lockdown, saving countless young lives. The last idea included examining statistics and weeding out some of the most dangerous guns and weapons in our society.

EXPERT INTERVIEWS (SESSION ONE)

As the pre-workshop interviews were conducted, one name kept emerging in conversation: a leader in Cattaraugus County, NY in the field of emergency planning, who most importantly helps schools, staff, teachers, students, and parents prepare and respond to crisis in schools. I attempted to get this individual involved in the design-thinking workshop, but his schedule would not allow it. Knowing that he needed to be incorporated in this project, the expert interview was added. The idea was to take the solutions generated at the workshop and hash them out with this individual and one other expert. The other expert is a designer at Cannon Design, an architectural design firm. This person focuses on school design.

The emergency planning individual came to the campus of St. Bonaventure University to sit down for his interview. The conversation started with talking about money and how it is used in the educational setting for different items, safety being one. The individual has developed a training program in collaboration with state lawmakers. However, it was not long before our conversation quickly turned to the simple, easy opportunities to keep a building safe: “locking the doors… There were two classrooms at Sandy Hook that weren’t even locked, after a lockdown was called.” That is a fact he usually states at the beginning of his training courses, to help with buy-in.

Cameras were another common talking point on this topic. He said, “Cameras are great, but you have to have the manpower to have someone monitoring them.” Being resourceful was a highlight of our conversation; using a bookcase as a barrier was one example. The most important item mentioned was “having a plan.” Older doors that are prevalent in Cattaraugus County, for example, can be forced open by an intruder. If you cut a piece of old firehose and had it on the top of the door, it makes it impenetrable. These low hanging solutions and routine maintenance items are the first thing he and his team look for when helping a school prepare.

Collaborating with architects when designing or re-designing a school is also important. Understanding that a window on a door should only provide a 180-degree view to prevent places to hide is important when saving lives. Open dialogue must occur between the state and local entities. While no one wants to have a drill during lunch, this is peak time for maximum carnage, as illustrated by Columbine. Our emergency planning individual runs a program that starts with administration buy-in, is 2 to 3 hours long, standardizes their protocol in that building, offers refreshers along the way, is all encompassing for staff, students, and parents, includes lockdown drill oversight, and has reached 200+ schools and 30,000 staff member throughout the state of New York.

The work of emergency planning is making a difference as "schools that are letting us come in and being receptive allowing us to develop a pilot program with a progressive superintendent." He acknowledges, though, that the harsh reality is that you are buying time until first responders can get on the scene. A recent caveat has been how to handle a fire alarm during an active shooter situation and/or drill. Other recent developments have been how to look at the contributing factor of mental illness, and how to leverage and monitor social media during an event.

The second expert interview took place with a designer at Cannon Design. We immediately started the candid 45-minute interview examining how we can keep people safe in an active shooter situation in high schools. Our discussion started with his view on what drives decision making in architecture for schools currently, and that is fire code. The fire code in New York State prevents architects and designers from fully implementing design features that could help in an active shooter situation. He stated, "The manual for safety has not been updated since 1998 and the word 'security' makes an appearance only once."

Square footage requirements that are directly linked to how many exit points a room must have leading to a corridor contribute to the safety of those spaces, especially when they are requiring two points of

regress or creating pocketed points. Finding the balance between fire code and safety measures is something that is a work in progress. Stairwell requirements are another item where fire code and safety research do not line up.

The designer spoke about working on Grand Island High School just as Sandy Hook happened and changes that were made based on information from that incident. The example he gave was moving the glass on classroom doors. It took away some line of sight in the event of a shooter looking in and created a safer space using design. He also talked a bit about doors and the ability to use things like “magnetic door releases” that combat fire code. It is costly because you are connecting that to a fire panel, but the safety they bring is often worth the cost. In addition, it does not combat the human factor (i.e., someone who is wedging the door open).

Asset preservation and cleanliness are factors that have to be considered when designing a school. The concept of a “lockbox” or “vestibule” are real design features that are being implemented in schools. A large problem that is seen with people accessing a school are custody issues between parents. We know that one entrance with multiple exits is on everyone’s wish list. Controlling exits via technology is something that is becoming more prevalent.

Something not mentioned throughout this process is students bringing in items and hiding them in locations throughout the building. We also spoke about metal detectors as a way to harden schools and perhaps change school culture, along with windows and how to secure and/or retrofit. Bollards were mentioned as well in order to prevent violence via a car or truck bomb.

As we shifted our conversation to technology, we talked about potential and practical uses of technology. Obviously, scanning IDs and using school IDs to scan in and out of buildings is an important safety feature. In addition, the designer commented he has seen high schools use facial recognition software as a safety feature in the school. At this point, mass notification systems are a main use of

technology. A common safety feature that you see or read about is clearly marking classrooms, but our designer pointed out the counterpoint, which is someone with a vendetta can easily identify where that person is located. Anonymity can be a safety net as well.

“Gunfire” technology, as we have seen in cities, was also discussed. Although helpful, it is costly. In addition, changing location of someone in the school building may render gunfire technology as inaccurate. Potentially re-thinking a lockdown and how it could cordon off certain areas of a building has potential, but does have cost associated with it. While millions of dollars are raised and allotted from the state to ensure school safety, distribution of those funds is based on an application process.

As we transitioned into some of the new monies that are available, the designer mentioned the disbursement of funds. Politics plays a role here, as school districts can allow a building to deteriorate to a certain point, in order to list it as a capital project, which has a direct correlation to how much funding is received. These are real games that are played and potentially affect safety.

The concept of hardening schools is prevalent in the research and I asked our designer if he had seen an over-hardening of schools. He responded, “I have not seen that yet, but if we moved to X-ray machines or metal detectors, that would be the tipping point.” Bringing up different layers of hardening a school as someone approaches, however, is something that should be done. The example he gave is if you see someone in an overcoat, while it is 80 degrees out, you should lock that building down.

I asked the designer to sum up his thoughts on how to make schools safer. He mentioned that a school should be locked down quickly, the addition of levels of hardening, creating good line of sight, and using biometrics to enter. He also spoke about building a comfortable environment, using 3M Film to retrofit windows, and prevent the “pockets of perversion,” which refers to areas to hide for people looking to do wrong.

The 3M Film is an easy way to retrofit windows to make them more durable and safer. It is something both interviewees have seen used to help create safer environments. The designer also mentioned the use of tempered glass as his recommendation, especially as it pertains to new construction. The other area of overlap between the pre-interviews through the expert interviews was to buy time for first responders to arrive.

CONCEPT MAPPING (SESSION TWO)

The student workshop began with concept mapping and the researcher took themes from the affinity clustering exercise (people involved, responders, preparation, responses, cause and effects, and infrastructure) in session one and placed those on the whiteboard. The students were then asked to discuss concepts that related to those themes. It was interesting to note that students were familiar with many of the concepts on the board, most commonly “run, hide, fight.”

Much of the conversation focused on physical features of the building that could potentially help or harm in an active shooter situation. The students did not have much to say on the topic of how technology could help, other than using it in the alert system process. The way people move into and flow throughout the building was something students spoke about, along with physical attributes, such as doors and windows. Another theme throughout their map was training teachers and having them be a resource of safety in case of an incident.

The change-maker group was not given the overarching themes from the affinity clustering exercise in order to expand their thinking. Instead, we began with an overall introduction to active shooter situations in high schools. Design and access points were immediately brought to the forefront for this group. The need to adapt existing schools and the budgetary constraints that come with that were also a topic. Another important concept repeated from round one resurfaced: “What are we designing schools for?”

The difference from the student and the change-makers group was clearly the willingness to delve into how technology could help solve this problem. One major topic was how much the culture of video games can tend to disconnect youth from the actual concept of death. While the change-makers spoke to technology and social media issues, they were unfamiliar with the concept of "run, hide, fight."

Both workshops with the student and the change-maker group provided a good starting point for the activities to follow by introducing key concepts and terms generated from session one affinity clustering (see Figures 19-21).

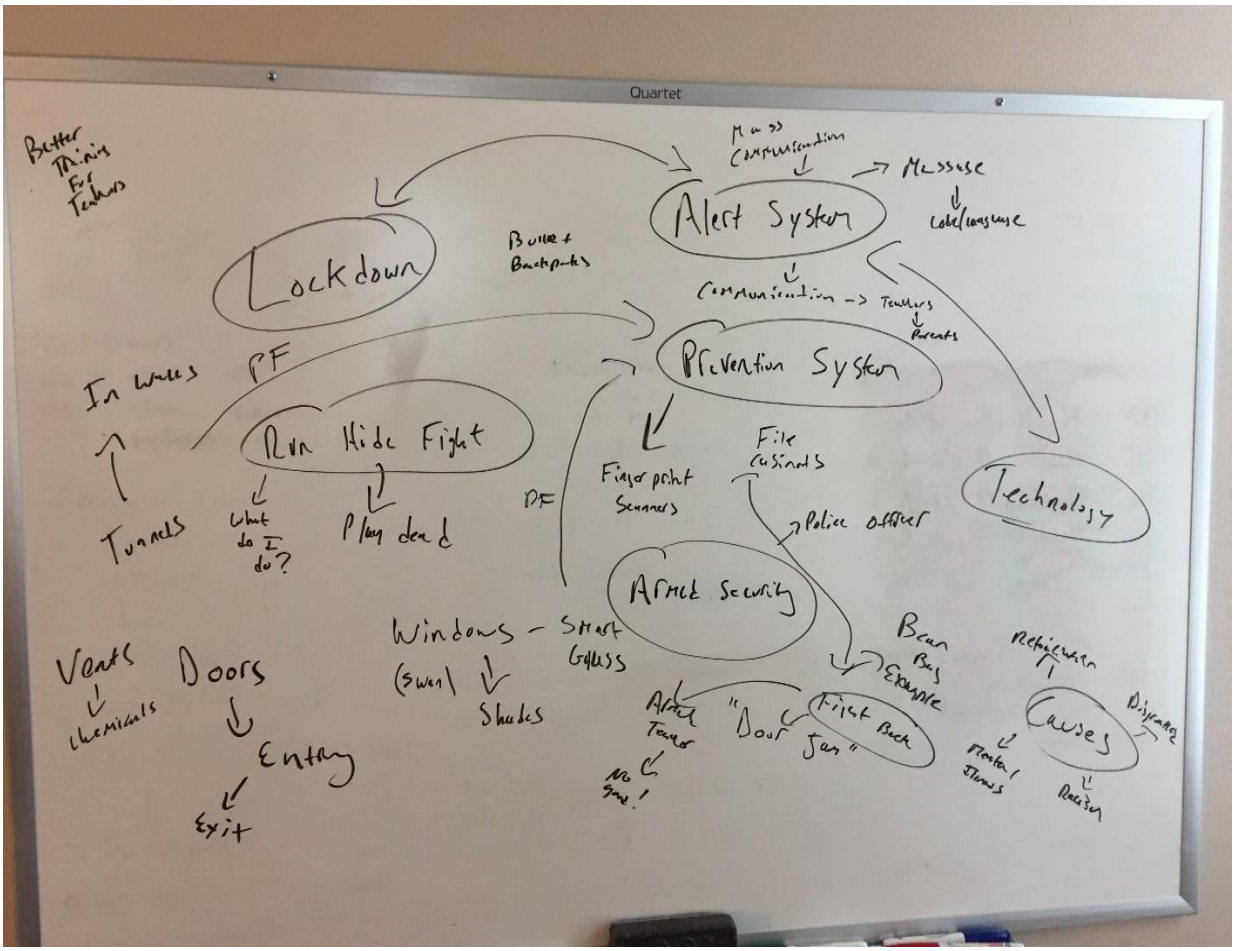

Figure 19 – Student Concept Map

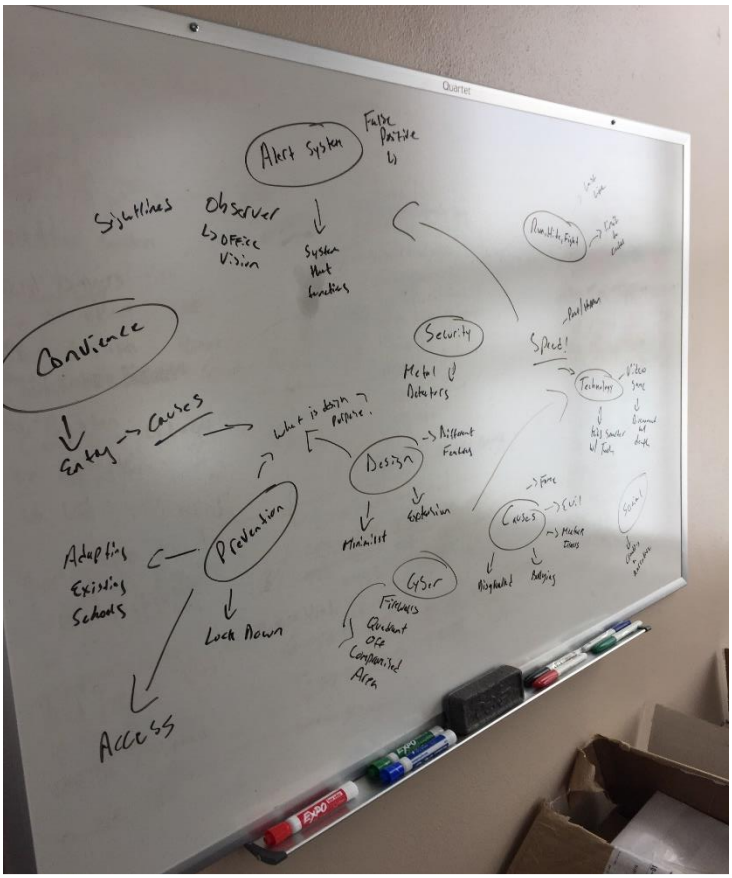

Figure 20 – Change-Maker Concept Map 1

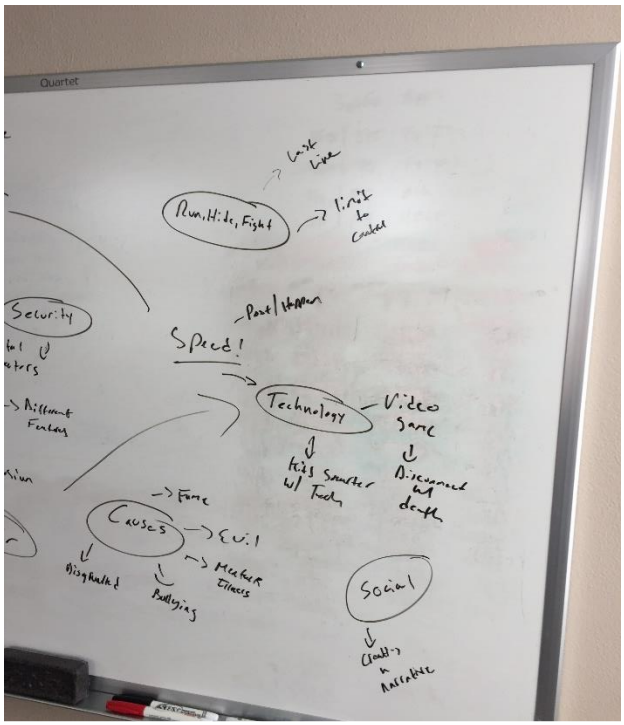

Figure 21 – Change-Maker Concept Map 2

ALTERNATE WORLDS (SESSION TWO)

In the student workshop, the six students were paired off into twos based on experiences they were most familiar with out of escape rooms, video games, superhero movies, comic books, and magic. At that point, each group was asked to solve the problem of active shooters in a high school through the lens of the given alternate world. After each group brainstormed for 3-4 minutes, they passed their ideas and allowed another pair to build upon what they had started.

The groups generated some out-of-the-box ideas to help solve for this problem: invisibility, telepathy, animals, and deception. Things like fighting robots, tranquilizer darts, silent instructions, and magnetically disabling firearms were also discussed. In another pair, they looked at weapons to fight back, such as slingshots and scissors, and ways to use furniture to make barriers in front of doors. Pepper spray in every room, breakable windows, and scanning systems at entrances were ideas that kept coming from this group. In the final pairing, they looked at force fields, zombies, potions, and drop-down walls. Adding on to that group, isolation walls, ways to distinguish the shooter, and panic buttons were mentioned.

For the change-maker group, we began with a piece of paper labeled with one of four items. The labels were “magician,” “comic book/superhero,” “escape rooms,” and “video games.” Each member was asked to solve the problem through the lens of the alternate world on his/her sheet. After 2-3 minutes, the sheet was passed to allow another member to add to what was already on the paper, or create more ideas through that alternate world.

On the comic book/ superhero sheet, it mentioned fighting your way out with the belief that you cannot be hurt or will not die. The use of teleportation and secret hiding systems were also mentioned. Bulletproof “power” and the best gear and abilities are something that set superheroes apart from normal humans.

On the magician sheet, distraction and sleight of hand were discussed. Smoke and mirrors as a way to get out of a situation, removing the weapon with a trick, or making the shooter disappear were other options. Other ideas included creating a diversion, distraction to escape or trap, finding a method to disorient a shooter, or using dazzling ways to camouflage yourself or create an optical illusion.

The escape room method looked at how puzzles are involved in moving from room to room, or step to step. This alternative world led to such ideas as applying locks to control movement, slow the shooter down, and lead people to a safe room. It is also important for you to think outside of the escape room while inside, as a way to get yourself out. One simple button as a way to lock down a school was a common theme on this sheet, especially something that mirrors a child lock system.

On the video games sheet, a body sensor was brought up as a way to trigger an alarm. Also mentioned was having a gunshot trigger as some sort of response from the built environment. A way to create mazes would be something that is done in video games as well. A more practical interpretation was to have video games be a simulation or training device for students and teachers. Customization of games to help law enforcement training was another idea.

The workshops helped both groups think innovatively and look through a different lens for answers to the question being posed (see Figures 22-24).

Figure 22 – Student Alternate Worlds 1

Figure 23 – Student Alternate Worlds 2

Figure 24 – Change-Maker Alternate Worlds

BULL'S-EYE DIAGRAMMING (SESSION TWO)

The addition of bull's-eye diagramming to the change-maker group was based on feedback from the researcher's committee. It turned out to produce the best discussion throughout this research. After a recap of the student workshop, the researcher took ideas that were generated from the students' alternate worlds and wrote them on sticky notes. From that point, the sticky notes were set aside. On the whiteboard, a bull's-eye with three rings was drawn. The center was primary, then secondary, and then tertiary. The change-maker group was tasked with prioritizing the solutions on the sticky notes.

In Figure 25 you can see where the solutions were placed on the diagram. In the primary, you had the use of facial recognition, pepper spray in every room, reinforcing doors/windows, alert system in every classroom, and distinguishing the shooter. In the secondary, you had drop walls/isolation, use of non-toxic gas with a ventilation system, and tranquilizer darts. In the tertiary, you had fighting robots, rope/ladder for high classrooms, creating a maze, exit through the underground, and trap doors/secret passages. Left off were potions, teleportation, parachutes, and magnetically disarming guns (see Figures 25-27).

The process around selecting where these solutions would be placed on the diagram led to in-depth conversation and helped the group start to see solutions or ideas. It was a great way of summarizing what the student group had done, while forming what could be realistically deployed to help solve this problem and prevent loss of life. What the group realized is that their primary options were based on affordability and practicality, which led back to what was seen in round one with status quo. The group also spoke about levels and layers of security. The last part of the conversation centered on how to interweave technology into this solution and clearly define the goals and objectives of how schools should be used.

The bull's-eye diagram helped to frame a path forward for this group. While innovative or outside the box solutions may not be feasible, they often lead to clarifications to problems that should be explored. This activity was successful in helping the group see past solutions and frame their path forward to generate new ones.

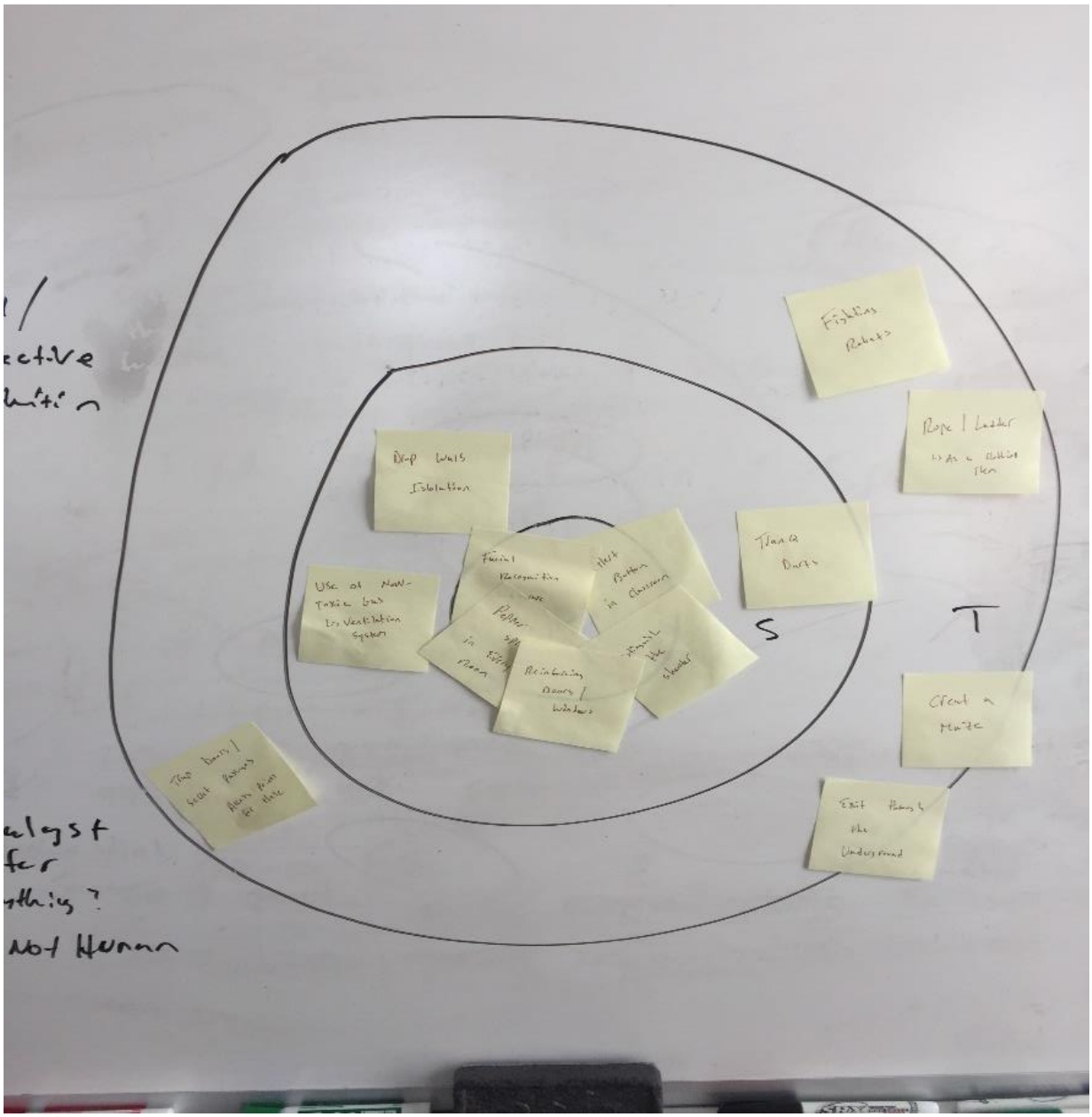

Figure 25 – Completed Bull's-Eye Diagram

Figure 26 – Change-Maker Bull's-Eye 1

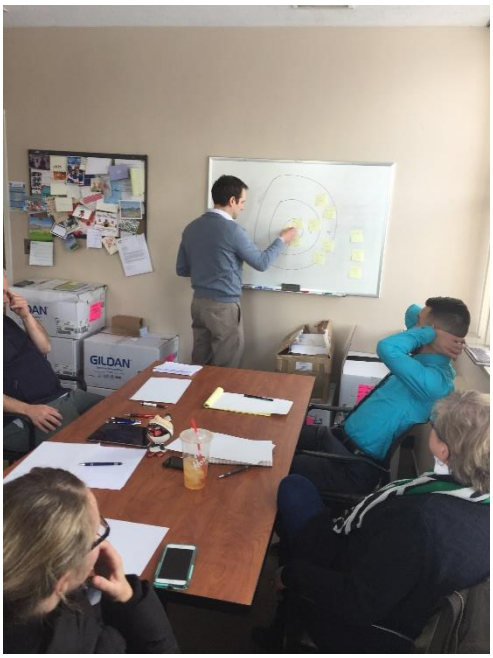

Figure 27 – Change-Maker Bull's-Eye

ROUND ROBIN (SESSION TWO)

In session one, the round robin exercise let each participant finalize his/her best idea given all of the discussion and activities executed. It was successful and the researcher decided to run this as the final activity again during session two. In both the student and change-maker workshops, participants generated ideas, critiqued, and solved for the problem.

In the student workshop, card scanners that allow students to enter one at a time was the first idea. Another idea of facial recognition and controlling access was also presented. The idea of using furniture or cabinets as barricades and create secret passages out of rooms is another solution generated. In addition, finding a way to isolate the shooter in the hallway would be optimal. The use of non-toxic gas through a ventilation system to knock out everyone was also posed as a solution. The idea of locking down parts of a building and controlling access was another. Finding a way to sure up doors and windows to be metal or bulletproof in some way would make the rooms safer. The final solution was having an alert button in all rooms and making sure that anyone who abuses it faces harsh consequences.

In the change-maker workshop, creating a culture where finding a solution and systematic approach to nurturing those solutions was proposed. We also had a great discussion centered on funding for this solution and how much should be appropriated towards the problem (see Figure 28). The idea of being realistic with goal setting as related to this problem was also presented. Participants posed the idea of using new technology at the entrance point of a school to detect guns immediately, and the critique sparked our funding talk. The entry point and having multi-faceted furniture that can be used as protection were the other takeaways from the change-maker round robin exercise (see Figures 28-29).

The round robin activity for both groups was the summary of the sessions. It produced a look at realistic solutions through the alternate worlds lens that we had not examined in session one. Overall, the solutions and critiques created good conversation and ideas that had not necessarily been explored. Ideas from all activities culminated at the round robin.

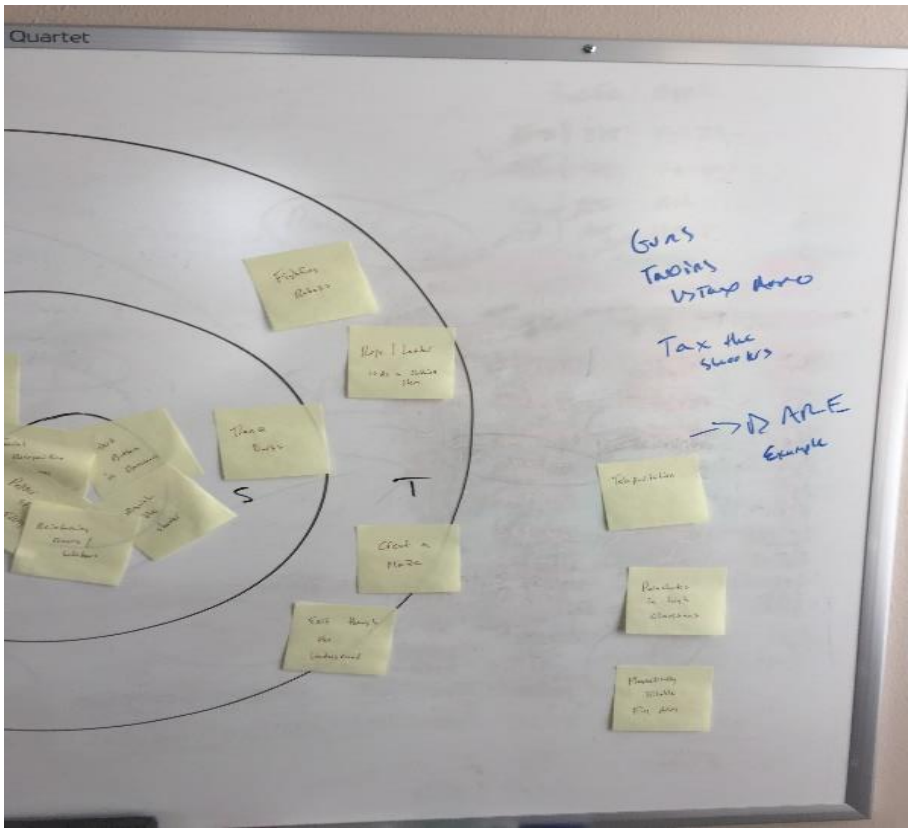

Figure 28 – Funding Discussion

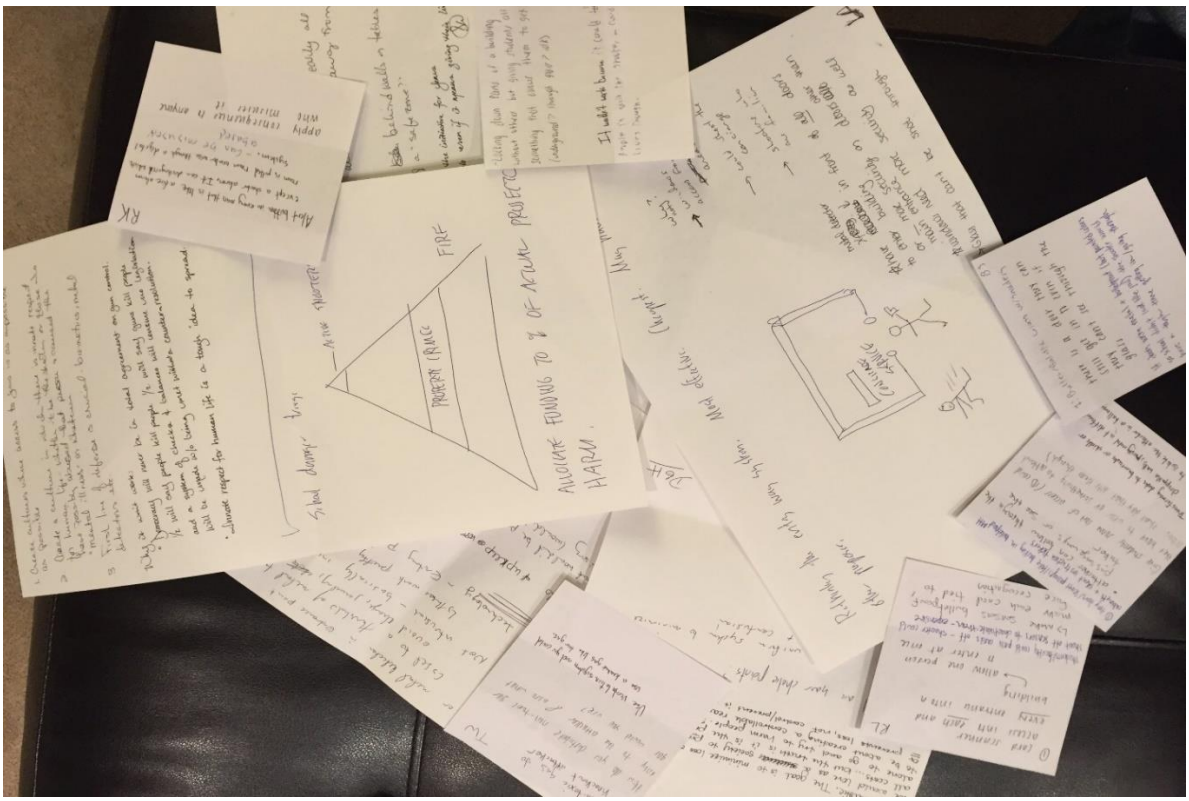

Figure 29 – Round Robin Session Two

DISCUSSION

COMMON THEMES (SESSION ONE)

Clear themes emerged throughout this process, including the research, pre-interviews, design-thinking workshops, and expert interviews. The causes of this problem are several different multifaceted issues, which means the solution will most likely be as equally complex. Humans, more specifically, American educators, have an important role to play in pushing these solutions forward.

The first common theme was training and buy-in from teachers, students, and parents alike. Stakeholders must have a willingness to comply with training, absorb the information, and put it to practical use. Human error is something often seen in training and drills, a lack of belief "that this could happen here" often contributes to a lack of preparedness that should be our first line of defense (Dorn et al., 2014).

The second common theme was the belief that technology could help solve this problem. In the early parts of this research, it felt as though the word "technology" was just a buzzword. However, as the research progressed, it became apparent, through articles of how technology is currently being used, that there is a place for technology in helping to reduce loss of life in an active shooter situation. A balance between cost and effective use of technology will be key in helping to create a solution (Bell, 2017).

The third common theme was controlling access points and utilizing cameras. It should be commonplace to control access to the building at this point. However, past situations will show that this does not deter a person from getting inside. In addition, sometimes people wanting to cause harm are familiar with the building or are even supposed to be in the building. Again, the human factor of that determination is very important (Levenson, 2018).

The fourth and final common theme was the use of SROs. An expansion or unification of how these are used seems to be something that interests all stakeholders. Some seem to think adding one or more will help to fix the problem. Others believed that an expansion of relationships and adult eyes in a high school would only lead to earlier detection and less of a threat.

COMMON THEMES (SESSION TWO)

The goal of session two was to generate innovative solutions to the status quo answers that were given during session one. Specifically, the goal was to find more diverse groups of stakeholders that could look for solutions outside of the common lens. As the groups in session two did that, different common themes emerged. The more practical common themes that emerged were not unlike session one, so these next three common themes will focus on the more fantastical ideas found.

The idea of secret passages/mazes was a way that all alternate worlds would seem to use to solve this problem. In the discussions and activities, it was clear that creating another exit system for people in a high school during an active shooter event would be something to consider. The practicality of this solution is hard to imagine, however it could prevent loss of life to have alternate methods of exiting not via the main entrance/exit.

Another common theme that emerged was identifying a gunshot/the shooter. The idea to completely neutralize a gun/person is something you would see in comic books, video games, and superhero movies. Practically, being able to track the shooter and understand where that person is creates opportunities to escape as well. If there was a way to neutralize a gun inside of a facility, there is potential for an increase in safety.

The final common theme from session two was transforming seemingly normal objects (e.g., desks, backpacks, doors, etc.) and using them as protection or even weapons, and was commonly seen in all the alternate worlds discussed. The ability to have multi-use objects that can provide protection and

opportunities to go on the offensive was discussed. Practically, retrofitting every school in the country is daunting, but if it provides an opportunity to keep students safe, it can be worth exploring. In many respects, this solution may not be as fantastical as it sounds, as bulletproof backpacks have entered the market, providing a method of protection for children.

Something not talked about in the student workshop, but a common theme throughout the change-maker workshop, was funding. Raising taxes, developing school funds, and investing in the complexity of the problem were mentioned. Funding gets back to the practicality of implementing these solutions, so it is worth noting that was on the minds of the participants in the change-maker group.

SOLUTIONS & OPPORTUNITIES

As a society, we have an opportunity to implement changes that can help to prevent loss of life in an active shooter situation in high schools. We must look to make systematic changes to deal with this phenomenon and spike in violence we are seeing.

Session one ideas:

- The use of technology is important in developing safer school buildings. We must have the capability to lock down a building at a moment's notice, with the push of a button. The ability to cordon off certain parts of buildings with the same touch of a button is becoming a necessity (Hobbs, 2018).
- Entering a school should be through a vestibule or separate room for visitors, including parents. Perhaps looking at keycard entrances for students and closely monitoring the entrance of students to a building needs more scrutiny, while being careful, however, to not delay the process and still set up students to succeed in an educational environment (Levenson, 2018).
- Looking at state building codes is necessary. The need to have fire safety and student health safety be equally important as written by legislation is of utmost importance.

- Widening corridors to eliminate places for active shooters to hide and seek refuge needs to become commonplace (Maddox, 2018).
- The addition of hardening levels as someone approaches a building with landscape, bus loops, and drop off areas can be successful in deterring these events. In addition, it can give administrators lines of sight for approaching causers of harm (Levenson, 2018).
- Looking to language, online especially, the development of software to help monitor and seek trends in the language of people who commit these crimes. A way to search for warning signs is critical (Bell, 2017).
- Continuing to prevent the over hardening of schools, by avoiding the use of metal detectors as much as possible (Warnick, 2018).
- Using outside features in design such as living walls creates a more connected learning environment (Martin et al., 2018).
- Bringing traditionally cut off places in school design into the open, most notably bathrooms and stairwells, creating an inclusive environment (Maddox, 2018).
- Continuing to train and drill all levels of stakeholders who traditionally interact with schools.
- Retrofitting as many schools as possible with items that will buy people time in the event of an emergency.
- Making sure that doors in classrooms can be locked from the inside. Evaluating windows on doors and making an informed decision about if they should be included. If they should be, how large and the vantage point you want to give must be considered.
- Evaluating how students move through the building and potentially having more locking doors through the course of the building.

Session two ideas:

- The use of non-toxic gas in order to eliminate a threat.
- Facial recognition software, the ability to trigger a lockdown with this technology; knowing who is in the building and moving where at all times.
- Trap doors and passageways that are controlled by scan access; alternate methods of exiting a building.
- Isolation drop walls to hide and furniture that can be manipulated into shields or weapons.
- The use of potions in neutralizing a shooter.
- A way to teleport out, or get someone away from you.
- Fighting robots.
- Creating a maze or a way to disorient a shooter.
- A way to tranquilize the shooter.
- Ability to magnetically disable a firearm, perhaps at the entrance or another location in the building.
- Having a defense system triggered with a gunshot.
- The ability to raise funding in order to build/retrofit for safer schools.
- Having a remote-controlled counter attack.

Potential New Solutions:

- An emerging new field inside of the criminology/psychology realm pushing the idea of an SRO/school psychologist hybrid positon. This individual would be inside of the school, building relationships with students. Perhaps most importantly monitoring behavior and social media.
- Development of mandatory mentoring structures inside of high schools.
- Looking at alert systems, especially in every classroom, to help identify where a shooter is. Communication during these events is critical.

- Reinforcing how students enter and exit a building, along with how students move throughout a building. The idea of locking down a building in phases and limiting access is critical to saving lives.
- The use of artificial intelligence in building systemic ways to recognize potential culprits.

The above solutions are not easy and most will require systematic changes and buy-in. We need to remember that with such a complex problem, it will take multifaceted solutions to solve. The sheer volume of schools, laws, and governing bodies to create true reform can be overwhelming upon first glance. However, looking at the larger problem, guns and violence, it becomes apparent that this is not just a problem that young people will face in school.

LIMITATIONS & FUTURE DIRECTIONS

As with any research study, there are limitations. First, recruiting individuals for this investigation was difficult, particularly since the interviews lasted 30 minutes and the design-thinking workshop was 1 hour. We were limited in the number of stakeholders who were willing to give this amount of time for both sessions. Thus, the findings from this research study cannot be generalized to the population.

Furthermore, the principal investigator determined the coding from the interviews and also generated the statement starter sentences. Future studies should add an additional researcher to review the interview data in order to increase the reliability of the findings. It might also be interesting to let the stakeholder participants generate the statement starters.

Perhaps the most interesting limitation, however, is related to the findings in both sessions. The goal of design thinking and research is to expand the body of knowledge and generate innovative solutions to a wicked problem. However, the results from session one of this study are status quo. Providing locks to doors, less glazing, hardening schools, opening hallways and stairwells, eliminating lockers, etc., are solutions that are provided throughout the literature (Craven, 2016; Levenson, 2018). The question

becomes, why did this design-thinking workshop not lead to more imaginative solutions? Why did session one lead to many solutions that considered hardening the environment? While we can design a building that controls entrances, how people move, and does not allow weapons, is this not considered a prison?

The potential new solutions mentioned previously came directly from the design-thinking workshop during session two. The student perspective highlighted the need for a mentoring program. Input from other stakeholders led me to think about this hybrid position. Another set of adult eyes, the ability to monitor building culture/behavior, and the educational similarities seen in the criminology and psychology fields point to this having potential to help prevent loss of life.

In this study, the researcher was heavily influenced by the research he was finding while preparing for the design-thinking workshop. Finding systematic changes, such as living learning walls, uses for new technology, and how social media influences schools, impacted questions that were asked in the workshop (Martin et al., 2018). Those questions were part of what led to getting answers pointing back to solutions found in the research.

Finding the status quo in session one from stakeholders that are close to the problem is not unpredictable. These stakeholders have had drills that highlight all of the common solutions seen in the research. However, in session two, a different approach was taken to gather innovative solutions. It did generate different ideas and potential ways to create solutions. While the solutions seem fantastical (e.g., secret passage ways, potions, etc.), starting with crazy or outside-of-the-box ideas can often lead to outstanding realistic solutions. Yet incorporating additional experts/stakeholders is key.

This research is still in need of creating a group of stakeholders comprised of innovative thinkers, including game designers, biomimicry experts, Disney professionals, and any other “big thinker” willing to participate who may provide increased innovation. The key to developing this session is a recruitment

approach using more selective questions and stakeholders that are not as close to the problem. Developing a way to virtually put this session together will be key, in order to involve stakeholders from across the country.

The hope would be for someone to pick up the research where I have left off. I would encourage that another set of eyes look at questions before the design-thinking workshop, to ensure you are not leading stakeholders to a specific endpoint. The amount of literature and information that we learn from each of these events is vast, and the more information and data we collect may lead us closer to a solution. Another session with diverse stakeholders, not so close to the problem, could help produce true innovative and realistic solutions to solving this wicked and tragic problem.

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APPENDIX A

PARTICIPATION EMAIL/PHONE CALL SCRIPT (SESSION ONE)

NAME,

My name is Doug Brady and I am a graduate student at Radford University. I am currently working on my master's thesis where my research will focus on high school safety during an active shooter situation. I believe that you may be able to help me with this topic.

I will be assembling a group of diverse stakeholders to include school officials, students, parents, design experts, and law enforcement officials. First, I will conduct individual interviews with each stakeholder that will take approximately 20 minutes each. We can do that in person, via phone, or Skype.

Once the interviews are complete, I will assemble the group for a 'design thinking' workshop to help identify the problem and potential solutions to safety during an active shooter situation. The workshop will last approximately one hour and 30 minutes.

I am asking you to participate because I believe you would bring a unique perspective to helping with this project. If you are interested in participating, please contact Doug Brady at 571-330-0503 or dbrady@sbu.edu. I appreciate your time and hope that you will work with me on this project.

Thank you,

Doug Brady

APPENDIX B

INTERVIEW QUESTIONS

1) Please describe your job and what you do.
2) Why do you believe you were asked to help with this study and how do you see your role in this group?
3) What safety features stand out to you in a high school?
4) How has that changed in the last 3 years? 5? 10?
5) What safety features could make a high school safer in an active shooter situation? In other words, how do you think loss of life could be prevented?
6) In your opinion, what are the top three factors that would contribute to a shooting at a school?
7) What community factors contribute to keeping children safe at school?
8) If you were building a school from scratch, what safety design feature would be most important to include in order to prevent loss of life?
9) Do you have any experience with an emergency guide or manual for an active shooter situation in a high school?

APPENDIX C

EXPERIENCE DIAGRAM

The previous activities will shape the research for the groups experience diagram. The experience diagram will walk through what different stakeholders will be doing during an active shooter situation.

1) From the establishment of 3-5 key stakeholders in an active shooter situation, the groups will diagram their experience. The group will determine the most important stakeholders to diagram, e.g., a teacher, student, law enforcement, etc.
2) Honing in on what they can do to keep themselves safe and help others.
3) The groups will diagram this in a flow chart, a working document that can take those 3-5 key stakeholders through the active shooter event.
4) Immersing into this and using the knowledge of what previous events have looked like will be a key to success.

APPENDIX D

AFFINITY CLUSTERING

The researcher will use information from the pre-workshop interviews and first half of the design-thinking workshop to develop themes. Items that have been discussed in the workshop and formed through research will be grouped together, developing themes and shaping what will be discussed in the second half of the workshop, which will include clearly labeling the clusters and including all possible areas of interest to inform final solutions.

APPENDIX E

STATEMENT STARTER

Using the information from affinity clustering, problems will be developed into statements, short phrases that summarize all that went into the cluster. From that, the researcher will add a starter to the phrases (see Figure 30). The group will then complete the phrases with the starter on the front of it. It will help the group to see other ways of looking at the problems that they have already identified and possible solutions for solving.

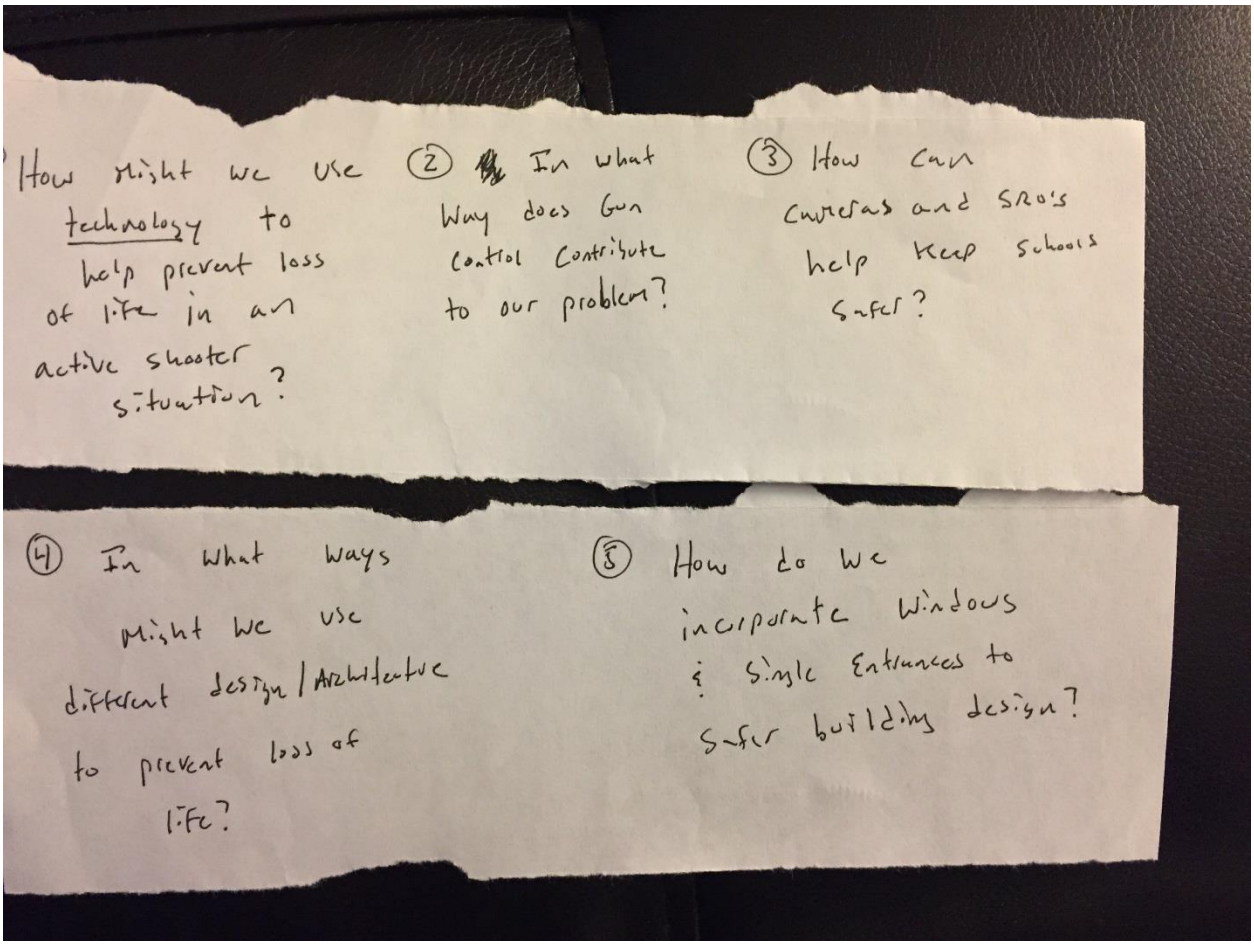

Figure 30 – Statement Starter Questions

APPENDIX F

ROUND ROBIN

Each person in the group completes this activity.

Each person has been given the identified problem. They will then write down a solution, as extreme as possible. Passing the sheet of paper, the person who receives the paper analyzes and critiques that solution.

After the critique, the paper is passed again and the person then in possession of the paper solves the critique. After this there will be a group discussion about the solutions and critiques. This should create tangible solutions that have been looked at for negative feedback.

SESSION TWO

This was the last activity completed by the student and systems groups. It was completed in the manner above and ideas were shaped by the entire session that the individual had just finished. The other activities completed were designed to help the stakeholder form ideas on how to solve the overarching problem from the researcher.

APPENDIX G

DISCUSSION & SCHEMATIC DIAGRAMMING

The final discussion will be based on information gathered throughout the entire process (see Figure 31). Focus is placed on solutions developed in the round robin activity. The researcher will be sure to take the discussion and put it into a simplistic style, compiling these solutions into diagrams for each one, with a clear path forward for implementation.

Figure 31 – Design Thinking Group

APPENDIX H

EXPERT INTERVIEWS

Two interviews will be conducted with people in the field directly related to solving this problem (see Figures 31 and 32). These include names that were heard throughout the research or are renowned for their work in the field.

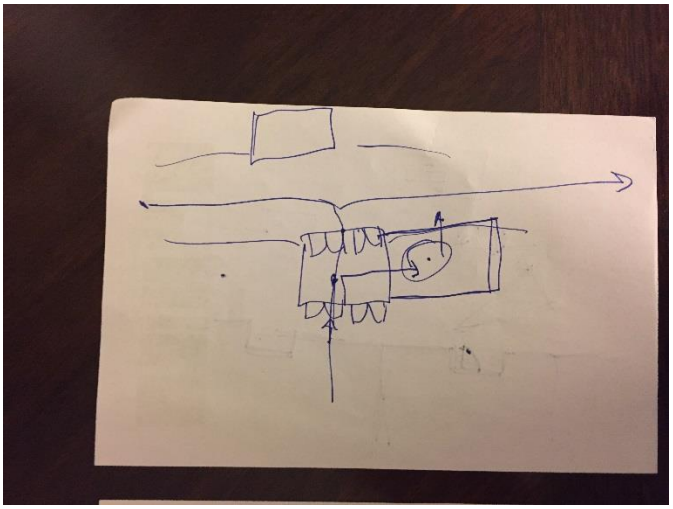

Figure 32 – Expert Interview Sketch 1

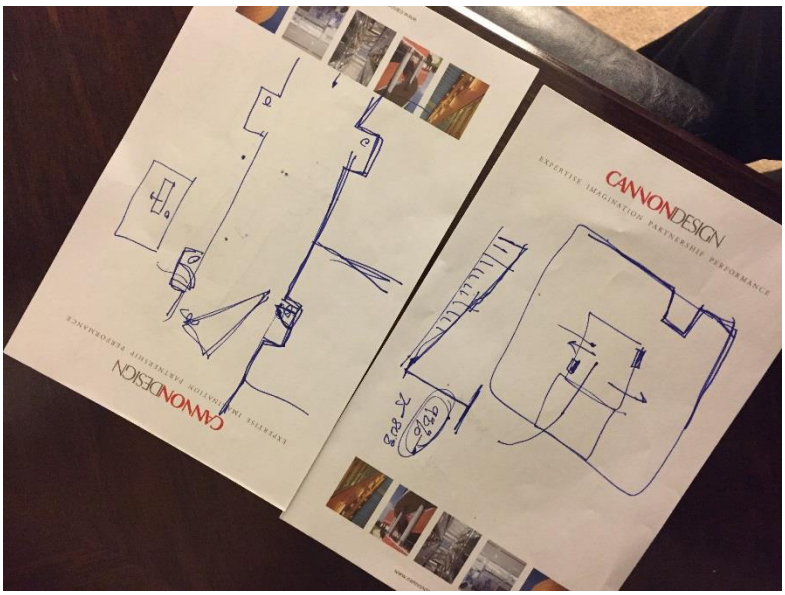

Figure 33 – Expert Interview Sketch 2

APPENDIX I

CONCEPT MAPPING

Since session two chose a group of stakeholders that was not close to the problem, the concept mapping exercise was added. This exercise started with the researcher asking what words and topics came to participants' minds when the problem was presented to them. The researcher then used terms from the affinity clustering exercise to make sure all topics and concepts were introduced.

The group made connections with the words and topics that were on the whiteboard. The map allowed an introduction to topics that are associated with the problem that participants may not have known existed. It also created productive conversation that set the stage for the rest of the workshop.

APPENDIX J

ALTERNATE WORLDS

The alternate worlds activity was added to make sure that participants were not limited in their thinking while solving this problem. No idea generated was too fantastical, if it presented a possible solution. It is a way for participants to immerse themselves in another universe and solve the problem.

In both workshops (student and change-maker groups), a few alternate worlds were given for context. They included video games, escape rooms, comic books, superhero movies, and magic. In the student workshop, participants were paired up and asked to look at a specific alternate world and how the problem would be solved from that perspective. In the change-maker group, the alternate world was written on a piece of paper, and every participant contributed to each alternate world. Participants could share and collaborate as they saw fit.

APPENDIX K

BULL'S-EYE DIAGRAMMING

A bull's-eye diagram is used to prioritize potential solutions. From the solutions generated in the student workshop, the change-maker's workshop took those and created a bull's-eye diagram. In the center were solutions that could most easily be implemented, working to the outer circles of hardest to implement. A discussion following the activity explained the reasoning behind decisions and prioritizing. This activity also helped shape the change-maker group's round robin experience.