

## ABSTRACT

Title of Thesis:	A NEIGHBORHOOD FOR KIDS: PROTECTING EDUCATION THROUGH DESIGN
	Carlos Manuel Vazquez Jr., Master of Architecture, 2023
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<p>Every year, small towns in America make major headlines for gun violence in schools and every time it's a heartbreak story. Hundreds of instances of gun violence in schools have made them all too familiar. Thoughts and prayers, vigils, talks of policy change and then right back to normal like nothing happened, waiting for the next one. The stage in which these events occur were designed in an era where these events weren't even a thought, and cannot properly protect students, nor are they conducive for creating a proper learning environment for today's youth. The aging buildings in the American school system are failing students and their communities. This thesis seeks to explore architectural solutions in aiding and preventing these attacks from occurring, while creating a more beneficial and positive learning environment for the 21st century.</p>	

# A NEIGHBORHOOD FOR KIDS: PROTECTING EDUCATION THROUGH DESIGN

by

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University of Maryland, College Park, in partial fulfillment  
of the requirements for the degree of  
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# Chapter 1: Schools, Guns, and Statistics

Architecture strives to balance function and design, yet the primary influential factor of design should be the emotional response the built environment can have on an individual. Gun violence and school systems mix as well as oil and water. Yet, this uncomfortable topic of discussion has become all too familiar in the United States. Today's school system has to come to grips with the reality that the epidemic of gun violence occurs in these sacred spaces. Spaces intended for learning and growth have become spaces of pain, tragedy and incidents of mass shootings with increased frequency and severity. To ask anyone, let alone a child, to return to an environment after such a tragedy is a tall order. Whether architects are prepared or not, the responsibility of building the built environment has extended beyond design. Architecture is now part of the national discussion of gun violence in schools. The spaces where these tragic events occur are not suitable for today's problems; nor do they provide the protection necessary for such events. Now, there is a responsibility to create facilities that not only protect the youth, but also heal communities. Such a discussion begs the question, how can design keep students safe while promoting a more beneficial learning environment?

## Statistics of School Gun Violence

Firstly, the characteristics of such an issue must be analyzed. The 1999 Columbine High School Massacre was one of the most tragic events in recent US history. The 15 deaths and 27 injuries left a scar on the community and nation. Even decades later, just the name Columbine evokes a visceral response as the term has become synonymous with the event. This

phenomenon is very telling of the weight these events carry. They strip more than the community's sense of security; they strip the community's identity. Unfortunately, this occurs all too often: Sandy Hook, Virginia Tech, Stockton, and now Uvalde. Communities that have lost their identity to school gun violence tragedies, marred by the damage inflicted in one event, forever changing a community's perception.

## Gunfire on School Grounds Sees Sharp Increase

Number of shootings at K-12 schools and their victims in the U.S. (1980-2022)

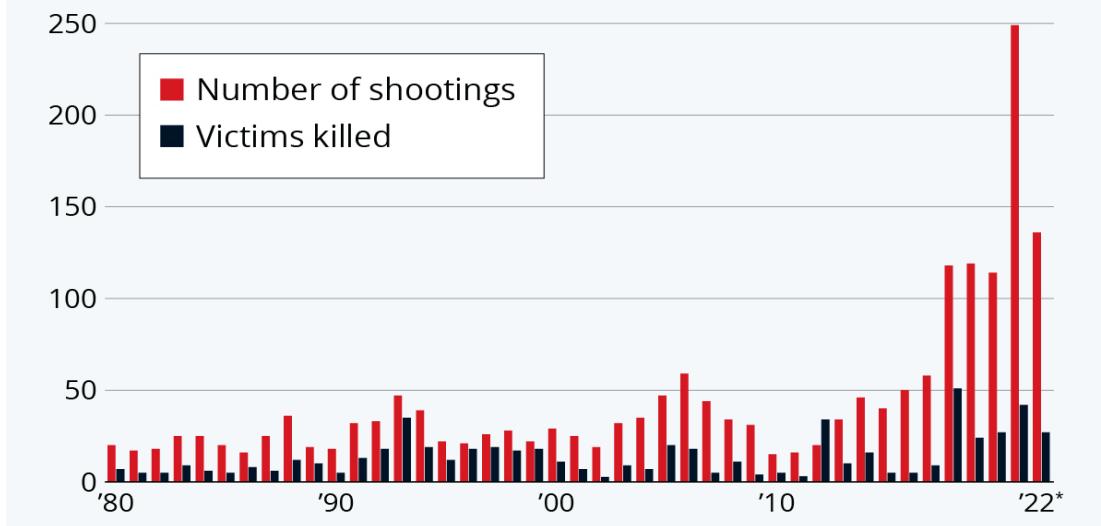
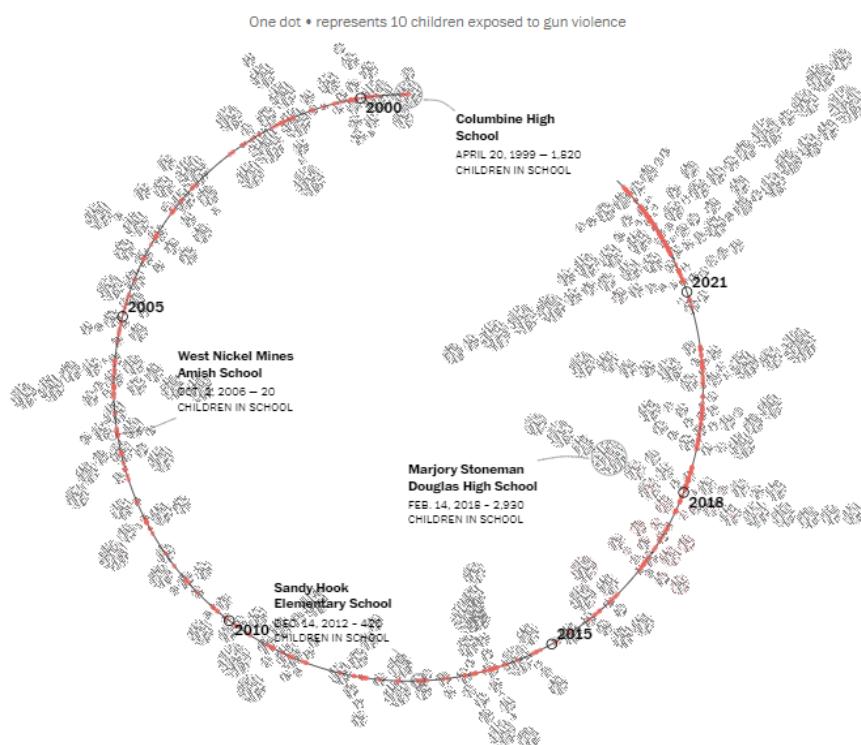


Figure 1: Gunfire on School Grounds Sees Sharp Increase (Source: Department of Homeland Defense and Security)

Since 1970, there have been 2,032 incidents of gun violence in schools, and 948 of those incidents have occurred since the Sandy Hook Elementary School Shooting of 2012.<sup>1</sup> After the 1999 Columbine shooting, 311,000 students experienced gun violence in school.<sup>2</sup> A study by the Federal Bureau of Investigation found that between 2000-2013, 24.4% of active shooter situations occurred in an educational environment, the second largest grouping.<sup>3</sup> Since then, not Only have these school shootings been on the rise in terms of frequency, but also in severity.



*Figure 2: Children Exposed to Gun Violence (Source: Washington Post)*

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<sup>1</sup> “Data Map For Shooting Incidents At K-12 Schools (Jan 1970-Jun 2022).” 2022. Data Map for Shooting Incidents At K-12 Schools (Jan 1970-Jun 2022). <https://www.chds.us/ssdb/data-map/>.

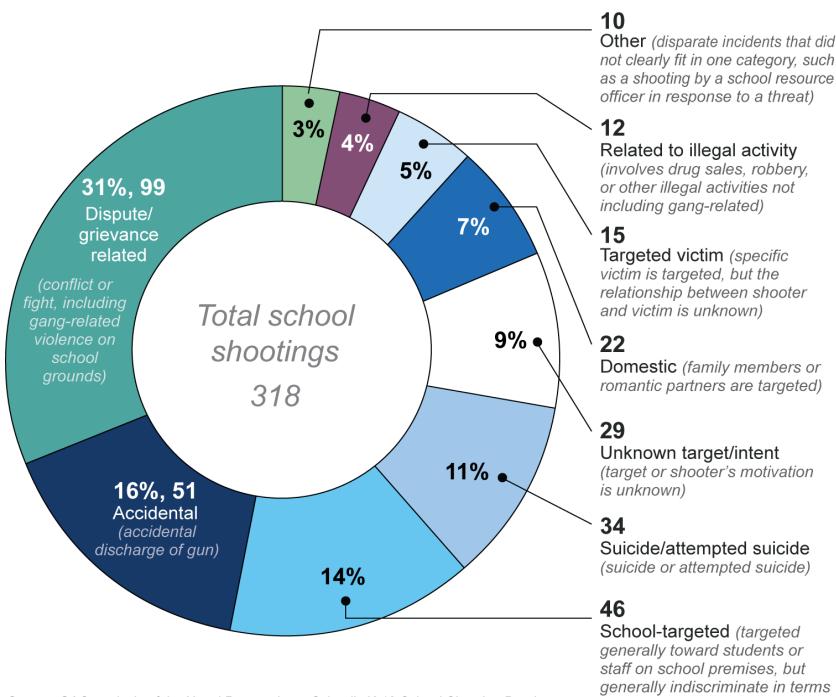
<sup>2</sup> John Cox. 2018. “Analysis | More than 233,000 Students Have Experienced Gun Violence at School since Columbine.” Washington Post. April 20, 2018. <https://www.washingtonpost.com/graphics/2018/local/school-shootings-database/>.

<sup>3</sup> Jones, Blair, and Schweit Katherine. 2013. “A Study of Active Shooter Incidents in the United States between 2000 and 2013.” [Https://Www.fbi.gov. U.S. Department of Justice Federal Bureau of Investigation. https://www.fbi.gov/file-repository/active-shooter-study-2000-2013-1.pdf](https://www.fbi.gov/file-repository/active-shooter-study-2000-2013-1.pdf).

While most shootings took place outside on school grounds, the incidents within the school resulted in more casualties.<sup>4</sup>

### Urban vs Suburban Violence

There must be an analysis of why these events take place and what leads students to be in these situations. Interestingly, the U.S. Government Accountability Office discovered that Most school-targeted mass shootings occurred in wealthy suburban and rural schools committed by students or former students. While these are less frequent, they tend to be more fatal.<sup>5</sup> Urban and higher minority areas have a higher rate of shootings overall, however, these are mostly dispute-driven instances, targeted at a particular person or group of persons. While more frequent, they



*Figure 3: School Shootings by Kind, School Years 2009-10 through 2018-19 (Source: U.S. Government Accountability Office)*

<sup>4</sup> Office, U. S. Government Accountability. 2020. “K-12 Education: Characteristics of School Shootings.” [Www.gao.gov](http://www.gao.gov). June 9, 2020. <https://www.gao.gov/products/gao-20-455>.

<sup>5</sup> Ibid.

are less fatal, and often committed by non-students.<sup>6</sup> This discovery led to an interesting debate in selecting a site location.

In one instance you have a higher rate of gun violence in urban areas bleeding into the classroom and school grounds. This plagues students' experiences and their communities. Safety measures like metal detectors and increases in school security officers, although well-intended, give students the impression that they are in a prison. Oftentimes these measures are counterproductive and in fact, create spaces and conditions unsafe for students.

One example of this is Baltimore City schools in Maryland. Gun violence is the leading cause of death among teens and in Maryland.<sup>7</sup> This is largely due to gun violence discrepancies involving students near school grounds. So, while Maryland has thankfully not seen a mass school-targeted shooting, there is a series of frequent smaller shootings, primarily in urban areas. One such example occurred on September 7, 2022, when a Mergenthaler Vocational Technical High School student was shot and killed in the parking lot just after school dismissal. A heated exchange with another student resulted in the murder of a 17-year-old student.<sup>8</sup> This is not an isolated incident, or even the most recent. It is a frequent occurrence within the Baltimore City Public School system. Incidents like this are the reason Maryland ranks so high in school gun violence even with some of the strictest gun laws in the country, ranking seventh in gun safety.<sup>9</sup> With this in mind, it can be seen that students within urban communities face an issue of safety

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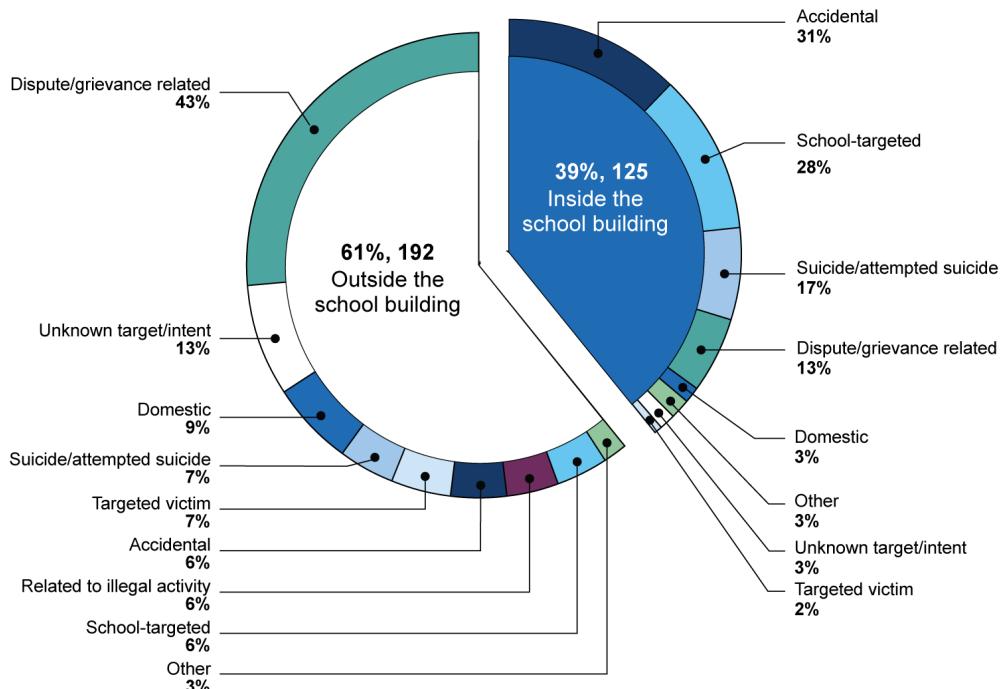
<sup>6</sup> Ibid.

<sup>7</sup> "How Does Gun Violence Impact the Communities You Care About?" 2022. How Does Gun Violence Impact the Communities You Care About? <https://everystat.org/#Maryland>.

<sup>8</sup> Rock, Amy. 2022. "Mervo High School Student Fatally Shot after Dismissal." Campus Safety Magazine. September 7, 2022. <https://www.campussafetymagazine.com/safety/mervo-high-school-student-fatally-shot>.

<sup>9</sup> Giffords. 2022. "ANNUAL GUN LAW SCORECARD." ANNUAL GUN LAW SCORECARD. <https://giffords.org/lawcenter/resources/scorecard/?scorecard=MD>.

not just within their school, but the communities these schools are located in. These events not only leave a lasting impact on the students but also give communities stigmas difficult to overcome. These types of incidents account for 31% of school gun violence incidents, however, they are more often committed by non-students.<sup>10</sup> These smaller, more frequent acts of violence, occurring primarily outside of the building, have lasting impacts on families and communities. These urban schools, primarily attended by students of color, have incidents that involve less than four casualties. This is critical because the Federal Bureau of Investigation expanded on the definition of “mass shootings” as having four or more casualties.<sup>11</sup> This would then not count the many incidents of gun violence occurring in the inner-city in their report, leaving communities not only with the pain of loss but also cries for help left unheard.



*Figure 4: School Shootings by Shooter, School Years 2009-10 through 2018-19 (Source: U.S. Government Accountability Office)*

<sup>10</sup> Office, U. S. Government Accountability. 2020. “K-12 Education: Characteristics of School Shootings.” [Www.gao.gov](https://www.gao.gov/products/gao-20-455). June 9, 2020. <https://www.gao.gov/products/gao-20-455>.

<sup>11</sup> Katsiyannis, Antonis, Denise K. Whitford, and Robin Parks Ennis. 2018. “Historical Examination of United States Intentional Mass School Shootings in the 20th and 21st Centuries: Implications for Students, Schools, and Society.” *Journal of Child and Family Studies* 27 (8): 2562–73. <https://doi.org/10.1007/s10826-018-1096-2>.

Suburban schools present a unique set of challenges differing from urban schools. These schools have a lower rate of gun violence overall, but a staggeringly higher rate of school-targeted violence. These school-targeted acts of violence lead to a higher rate of "mass shootings" making them less frequent, but with far more fatalities. These incidents account for 14% of school shootings, occurring primarily within the building and are committed by students or former students. While these are far less frequent, these school-targeted attacks account for more than half of the fatalities in school gun violence.<sup>12</sup> This leads to the conclusion that school-targeted violence is not only more lethal, but school systems are simply not equipped to handle such a shocking amount of damage and cannot respond effectively. These events take not only lives but also the community's sense of security.

These small-town American communities have been thrown to the front page of the news more frequently than ever. In 2018, the Associated Press found that nine out of the ten deadliest school shootings (at the time) occurred within towns of less than 75,000 people, many holding less than 50,000 residents.<sup>13</sup> These occurrences can be attributed to a vast assortment of issues, from firearm access to individuals wanting to copy other perpetrators, even to a false sense of security. These small towns often do not have the resources to respond as quickly or preemptively as urban schools. There is a clear set of different characteristics separating suburban and urban schools. While urban school gun violence cases are largely low fatalities and more attributed to personal or gang grievances, suburban schools have lower rates of

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<sup>12</sup> Office, U. S. Government Accountability. 2020. "K-12 Education: Characteristics of School Shootings." [Www.gao.gov](https://www.gao.gov/products/gao-20-455). June 9, 2020. <https://www.gao.gov/products/gao-20-455>.

<sup>13</sup> Pane, Lisa. 2018. "U.S. News & World News." Chicago Tribune. May 22, 2018. <https://www.chicagotribune.com/nation-world/ct-mass-shootings-small-towns-20180521-story.html?ewsn=8660507c56b04dd0b580b248d39d2a2c>.

occurrences, but much higher rates of fatalities, leaving small towns where everyone knows everyone to pick up the pieces.

The discussion of gun violence in schools evokes a strong emotional response across the country, involving political activism, emotional turmoil, and fear amongst communities in cities and small towns alike. It is, however, a discussion that must be had, not only from a legislative and political view, but also an architectural one. One thing is clear, the schools are simply not designed to handle this level of increasing violence and should not just be accepted as the stage for these events to occur. Architecture alone cannot answer this issue or stop them from happening altogether. It can, however, lessen the impact these shootings have on communities in the event they occur, better protecting students and providing a more productive learning environment.

### Demographics

In order to better understand the issue from a holistic view there must be a statistical analysis of who is affected by these events, as well as who is committing these offenses. This would allow for better preemptive measures to be taken place. From 1970 through 2020, the majority of school shooters fall between the ages of 15-18 years old, a critical part of any childhood development, with a significant number of outliers falling in the 31 and over range.<sup>14</sup> Age 17 contains the highest number of individuals who carried out these acts. This is a clear indicator that something is happening within the high school age range that could be linked to

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<sup>14</sup> CHDS. 2020. “K-12 School Shootings in the U.S. By Age of Shooter 2020.” Statista. June 2020. <https://www.statista.com/statistics/971544/number-k-12-school-shootings-us-age-shooter/>.

this phenomenon, whether it's a lack of mental health outreach, firearm access, or past trauma.

While the majority of active shooters are predominately white, the breakdown of the race of shooters actually follows the racial demographics of America.<sup>15</sup> This leads to the conclusion that while most shooters are white, this phenomenon affects all races across the population as can be seen in the urban school analysis, which largely affects minority students.

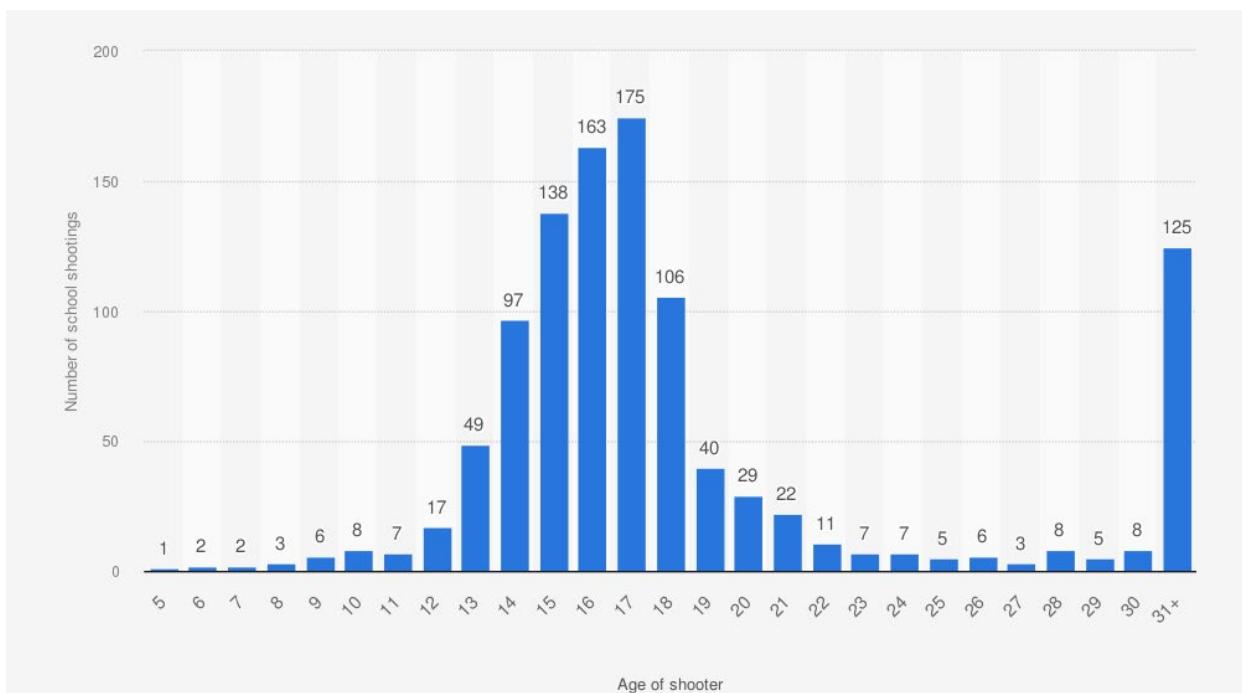


Figure 5: Number of K-12 School Shootings by Age of Shooter (Source: Center for Homeland Defense and Security)

<sup>15</sup> Jones, Mother. 2022. "Mass Shootings by Shooter's Race in the U.S. 2022." Statista. November 2022. <https://www.statista.com/statistics/476456/mass-shootings-in-the-us-by-shooter-s-race/>.

Further investigation into the type of individual that carries out these acts discovered that both the Federal Bureau of Investigation and Homeland Security concluded that there is no one “profile” for a shooter, as they can vary for multiple reasons.<sup>16</sup> While there may not be any one group these individuals fall in there are commonalities that can be concluded. The number one common factor many of these shooters have been premeditation and planning. The Department of Education and Secret Service found that 93% of mass shootings were planned in advance and 95% are current students.<sup>17</sup> Based on the common age range, these individuals are most likely current or former students with familiarity with the school, its layout, school practices, and drills. These acts are rarely ever random and are mostly motivated by intentions of revenge or with multiple motives. Warning signs are displayed leading up to these events, many of which go unnoticed or unreported, and in almost 80% of cases someone had knowledge that the attacker was planning to do something.<sup>18</sup> While this can be an uncomfortable notion to think about, it is critical that it is taken into consideration when addressing the safety of students. Many of these behaviors can be predicted, and if addressed early, can allow for early intervention. A proactive response is much more valuable than a reactive one. That is why it's critical for design to be considered in the proactive planning of student safety. New design techniques can not only foster healthier environments for students to get the support they need but can also allow for better

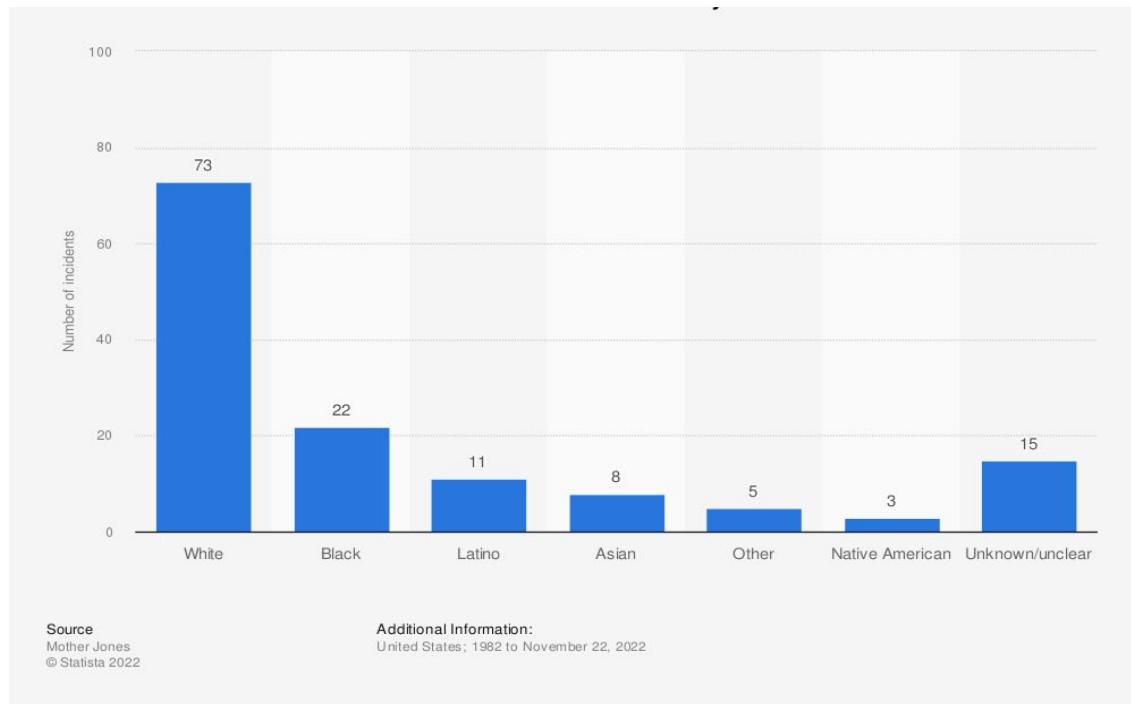
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<sup>16</sup> Mohandie, Kris. 2002. School Violence Threat Management : A Practical Guide for Educators, Law Enforcement, and Mental Health Professionals. San Diego, Calif.: Specialized Training Services.

<sup>17</sup> Vossekuil, Bryan. 2002. Review of The Final Report and Findings of The Safe School Initiative: Implications for The Prevention of School Attacks in The United States. United States Secret Service and United States Department of Education. June 2002.

<sup>18</sup> Ibid.

security measures to be taken place ahead of time, leading to better outcomes than the ones currently taking place.



*Figure 6: Number of Mass Shootings by Shooters Race or Ethnicity (Source: Center for Homeland Defense and Security)*

Gun violence is the leading cause of death among children and teens in the United States.<sup>19</sup> This issue should be the number one focus for protecting today's youth. The effects of gun violence have lasting impressions on students both long and short term. Some can even develop Post-Traumatic Stress Disorder, behavioral changes, withdrawal, or mental health challenges<sup>20</sup>. If these events occur inside the students' school, a place they are supposed to be safe and feel protected, how can anyone, let alone a child, be expected to return to the same place?

<sup>19</sup> "A Public Health Crisis Decades in the Making a Review of 2019 CDC Gun Mortality Data." 2021. The Coalition to Stop Gun Violence. The Educational Fund to Stop Gun Violence. chrome-extension://efaidnbmnnibpcajpcgclefindmkaj/https://efsgv.org/wp-content/uploads/2019CDCdata.pdf.

<sup>20</sup> Garbarino, James, Catherine P Bradshaw, and Joseph A Vorrasi. 2002. "Mitigating the Effects of Gun Violence on Children and Youth." *The Future of Children* 12 (2): 73–85. https://doi.org/10.2307/1602739.

## Chapter 2: Psychological Impact

Firearms are an embedded aspect of American society. Cultural icons from video games, movies, and historical figures expose children to guns from an early age. Many children develop familiarity with firearms through games and stories. 30% of Americans own at least one gun, with 36% saying they could see owning a gun in the future.<sup>21</sup> Not all guns are used for violence. Many gun owners utilize them as tools for hunting, sport, or personal protection. Yet, despite the various laws to limit the access of guns to minors or falling into the hands of those who seek to do harm, gun violence still occurs daily. Today, 1 in 18 teens in the U.S. carry a firearm to school.<sup>22</sup> A staggering number that can lead to devastating impacts affecting the psyche of students. The issue with gun violence compared to other forms of violence is the speed at which lives can be taken with little sensory feedback to stop aggressive behaviors. The choice to use firearms as a means of intent to cause harm indicates a higher level of aggression.<sup>23</sup> With the recent increase in mass school shootings in the United States, there must be an exploration into the psychological impact that can occur on students and their communities to better assess the current mental health conditions students are facing, as well as the after-effects these events can have.

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<sup>21</sup> NW, 1615 L St, Suite 800 Washington, and DC 20036 USA 202-419-4300 | Main 202-857-8562 | Fax 202-419-4372 | Media Inquiries. 2017. “Many Adults Who Don’t Currently Own a Gun Could See Themselves Owning One in the Future.” Pew Research Center’s Social & Demographic Trends Project. June 20, 2017. [https://www.pewresearch.org/social-trends/2017/06/22/the-demographics-of-gun-ownership/psdt\\_2017-06-22-guns-01-11/](https://www.pewresearch.org/social-trends/2017/06/22/the-demographics-of-gun-ownership/psdt_2017-06-22-guns-01-11/).

<sup>22</sup> Timsina, Lava R., Nan Qiao, Alejandro C. Mongalo, Ashley N. Vetro, Aaron E. Carroll, and Teresa M. Bell. 2019. “National Instant Criminal Background Check and Youth Gun Carrying.” *Pediatrics* 145 (1): e20191071. <https://doi.org/10.1542/peds.2019-1071>.

<sup>23</sup> Garbarino, James, Catherine P Bradshaw, and Joseph A Vorrasi. 2002. “Mitigating the Effects of Gun Violence on Children and Youth.” *The Future of Children* 12 (2): 73–85. <https://doi.org/10.2307/1602739>.

## Student Impact

Gun violence in schools often takes the lives of students and faculty. It also can take away many other aspects of the lives of the survivors. These events can lead to students having mental health issues, higher rates of medication, drops in enrollment and performance, and lower graduation rates. These tragedies also greatly affect the communities they happen in by taking a sense of security and identity.

The sanctuaries of education in which these events happen have a great impact on the effect of children's mental health. Between 2018 and 2019 over 100,000 students were exposed to gun violence in school.<sup>24</sup> In the same way, Black and Hispanics feel a strong connection to same-race victims of police brutality, children feel a similar effect during times of tragic mass shootings in schools. This leads to students losing their trust in their schools to keep them safe. This could also lead to the explanation for lower attendance in schools after these events occur. Studies have shown that following a shooting, students who were exposed had a 12.1% increase in absences, and a 27.8% increase in chronic absences, and were twice as likely to need to repeat a grade.<sup>25</sup> The effects can be felt by students long-term as well. These events cause students to develop Post-Traumatic Stress Disorder, sleep disorders, and withdrawal.<sup>26</sup> The experiences these children go through are traumatic for anyone. An example is 11-year-old Miah Cerrillo, a survivor of the Robb Elementary Massacre in Uvalde, Texas. She feared for her life that the

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<sup>24</sup> Rossin-Slater, Maya. 2022. "Surviving a School Shooting: Impacts on the Mental Health, Education, and Earnings of American Youth | Stanford Institute for Economic Policy Research (SIEPR)." Siepr.stanford.edu. June 2022. <https://siepr.stanford.edu/publications/health/surviving-school-shooting-impacts-mental-health-education-and-earnings-american>.

<sup>25</sup> Ibid.

<sup>26</sup> Garbarino, James, Catherine P Bradshaw, and Joseph A Vorrasi. 2002. "Mitigating the Effects of Gun Violence on Children and Youth." *The Future of Children* 12 (2): 73–85. <https://doi.org/10.2307/1602739>.

gunman would return, so she covered herself in the blood of her fallen classmates and played dead to survive. She covered herself in a blanket during interviews recounting what happened as a coping mechanism and is startled by loud sounds like a phone alarm or vacuum.<sup>27</sup> 11-years old, a child, going through trauma no one should have to. Understanding what these kids go through is critical in understanding how important it is to improve the safety and security of these children.

### Community Impact

With many other stressors of life, school shootings only add to the flood of traumatic experiences communities face. These events and the constant coverage of them leave communities on edge, resulting in a third of adults avoiding certain public spaces in fear of shootings.<sup>28</sup> Public space is for all of the community to enjoy, not be feared. These events rob communities of their sense of security and mental health. While mass shootings account for a small portion of gun-related violence, they have become more frequent and stay in the front of the public mind. Symptoms of trauma vary from each person, but the general public community in which these events happen experience forms of numbness, panic, and cycles of distress robbing communities of their peace.<sup>29</sup>

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<sup>27</sup> CNN, Nora Neus and Melissa Alonso. 2022. "She Smeared Blood on Herself and Played Dead: 11-Year-Old Reveals Chilling Details of the Massacre." CNN. June 8, 2022. <https://www.cnn.com/2022/05/27/us/robb-shooting-survivor-miah-cerrillo/index.html>.

<sup>28</sup> Bethune, Sophie. 2019. "One-Third of US Adults Say Fear of Mass Shootings Prevents Them from Going to Certain Places or Events." [Https://Www.apa.org](https://www.apa.org), August 15, 2019. <https://www.apa.org/news/press/releases/2019/08/fear-mass-shooting>.

<sup>29</sup> Abrams, Zara. 2022. "Stress of Mass Shootings Causing Cascade of Collective Traumas." Apa.org. September 1, 2022. <https://www.apa.org/monitor/2022/09/news-mass-shootings-collective-traumas>.

The names Uvalde, Parkland, Newtown, Columbine, and many others lose their identity. They become synonymous with the tragedies that occurred there despite the communities having so much to offer. Rebuilding schools in a safer way is more than about the building. It's about protecting a community's identity and adapting to this developing situation with a new way of designing.

## Chapter 3: Proactive vs Reactive Response

The response of communities and nations on how to move forward from these attacks set a precedent for our values and vision for the future. The balance of respect and mourning loss, the reactive fearful response pondering “this really could happen anywhere”, and the natural instinct to protect the youth are all factors that weigh heavily on the response to these situations. There must be a consideration of which safety measures have adverse effects and which are counterintuitive but highly effective measures.

### Proactive Response

Community responses can be categorized into two measures: proactive, measures that provide safety in order to prevent these events from taking place (i.e., resource officers, metal detectors, etc.), and reactive, security measures that respond to the situation either during or after these events happen (lockdowns, police intervention, etc.). Both are necessary for providing the safest possible experience for students, but not all are equal in their effectiveness nor their perception of the communities they are placed in

## Metal Detectors

One such example is metal detectors. This practice started in the 1980s as a means of violence reduction within schools.<sup>30</sup> Although metal detectors can be effective in screening each student and faculty member heading into the school, they do present a set of drawbacks that limit their effectiveness. Firstly, metal detectors present a physical and symbolic barrier between spaces. This can not only influence the public's perception of the school, but also the student's relationship to the learning environment. They are being treated as if they have done something wrong, and this can unintentionally send the wrong message to students that there is a prevalent violence issue within the school.<sup>31</sup> In terms of safety, there are new issues developed with this practice. This often creates clusters of students, standing in long lines waiting just to enter their school.<sup>32</sup> Imagine busloads of students every morning having to stand outside in the heat and cold waiting just to pass a metal detector. This presents a severe time investment needed, typically with later start times, just to screen each student.<sup>33</sup> This can have a severely detrimental effect on their learning experience. Not only can they affect the student's experience but creating a large mass of students in the open without any security measures to protect them until they get inside, means that potential threats do not need to even enter the building.

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<sup>30</sup> Borum, Randy, Dewey G. Cornell, William Modzeleski, and Shane R. Jimerson. 2010. "What Can Be Done about School Shootings?" *Educational Researcher* 39 (1): 27–37. <https://doi.org/10.3102/0013189x09357620>.

<sup>31</sup> Hankin, Abigail, Marci Hertz, and Thomas Simon. 2011. "Impacts of Metal Detector Use in Schools: Insights from 15 Years of Research\*." *Journal of School Health* 81 (2): 100–106. <https://doi.org/10.1111/j.1746-1561.2010.00566.x>.

<sup>32</sup> Daniels, Keith. 2022. "Baltimore City Schools Security Measures Causing Long Lines, Students Late for Class." WBFF. May 9, 2022. <https://foxbaltimore.com/news/local/baltimore-city-schools-security-measures-causing-long-lines-students-late-for-class>.

<sup>33</sup> Lohman, Judith. 2003. "School Security Measures." <Https://Www.cga.ct.gov/Olr/>. November 3, 2003. <https://www.cga.ct.gov/2006/rpt/2006-R-0668.htm>.

There is even debate on the effectiveness of metal detectors as a whole. In airports, where metal detectors are a common practice for large quantities of people. The Transportation Security Administration reported an almost 80% fail rate in weapons checks as recently as 2017.<sup>34</sup> These operators are trained extensively on these machines and yet the human factor always comes into play and can limit their effectiveness. It's as if they provide a veil of security rather than safety itself.

This leads to the issue of cost and training for schools to use metal detectors as a security measure. The initial cost for the equipment alone can range from \$4,000-\$5,000 for one machine.<sup>35</sup> This is a significant cost to schools, let alone the need for multiple machines given larger student population sizes. There is also the cost of maintenance and operation, employing and training at least 4 people to work each machine.<sup>36</sup> This ongoing expense must be considered in the school's budget pulling resources from already underfunded areas of the school. There is something to be said about the architecture of a space if the first order of security is a physical barrier every child must be processed through with at best questionable effectiveness.

### School Resource Officers

Another presence of school security as a means of addressing this issue is School Resource Officers. Studies have shown that school-targeted shooters were not “deterred due to

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<sup>34</sup> KERLEY, DAVID. 2017. “TSA Fails Most Tests in Latest Undercover Operation at US Airports.” ABC News. ABC News. November 9, 2017. <https://abcnews.go.com/US/tsa-fails-tests-latest-undercover-operation-us-airports/story?id=51022188>.

<sup>35</sup> Green, Mary. 1999. “National Institute of Justice a Guide for Schools and Law Enforcement Agencies -Volume I - the Appropriate and Effective Use of Security Technologies in U.S. Schools the Appropriate and Effective Use of Security Technologies in U.S. Schools.” National Institute of Justice.

<https://nij.ojp.gov/library/publications/appropriate-and-effective-use-security-technologies-us-schools>.

<sup>36</sup> Schneider, Tod. 2001. “CLEARINGHOUSE on EDUCATIONAL MANAGEMENT • UNIVERSITY of OREGON ® S Newer Technologies for School Security.” Eric Digest.

the presence of metal detectors, locked doors, security cameras, or [school resource officers]”.<sup>37</sup>

An argument can be made that S.R.O.s can be effective during an active shooter situation, however as evident in the recent school shooting in Uvalde, both the school officers and local police force infamously did not act during the attack.<sup>38</sup> Not only did this anger the community, but sparked a debate within the country on the effectiveness of school resource officers. A study done between 1999-2018 found that of the 179 school shootings, found “no evidence that school resource officers lessened the severity of school shooting incidents”.<sup>39</sup> A perpetrator's knowledge of a school officer being present at the school can cause them to come even more heavily armed leading to a worse situation.

There is also the effect a larger security presence has on students and their learning experience. A report in 2019 found that over 14 million students attend a school with police, but no counselors, social workers, or nurses.<sup>40</sup> That is a staggering number of students without any proper health care practices offered at their school, yet they are near the presence of a firearm. There is also the negative effect S.R.O.s can have on the student body as they are not always well-equipped or well-trained to handle student issues. Officers can and do arrest students, a study found that over 54,000 were arrested.<sup>41</sup> The reasoning for these arrests are so minor they are almost laughable if they didn't severely harm students ranging from throwing paper airplanes

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<sup>37</sup> Bower, Erica. 2021. “Eric Madfis: How to Stop School Rampage Killing: Lessons from Averted Mass Shootings and Bombings.” Critical Criminology, February. <https://doi.org/10.1007/s10612-020-09547-9>.

<sup>38</sup> Despart, Zach. 2022. “‘Systemic Failures’ in Uvalde Shooting Went Far beyond Local Police, Texas House Report Details.” The Texas Tribune. July 17, 2022. <https://www.texastribune.org/2022/07/17/law-enforcement-failure-uvalde-shooting-investigation/>.

<sup>39</sup> Livingston, Melvin D., Matthew E. Rossheim, and Kelli Stidham Hall. 2019. “A Descriptive Analysis of School and School Shooter Characteristics and the Severity of School Shootings in the United States, 1999–2018.” Journal of Adolescent Health 64 (6): 797–99. <https://doi.org/10.1016/j.jadohealth.2018.12.006>.

<sup>40</sup> Whitaker, Amir. 2019. “Cops and No Counselors How the Lack of School Mental Health Staff Is Harming Students Acknowledgements.” ACLU. ACLU. <https://www.aclu.org/report/cops-and-no-counselors>.

<sup>41</sup> “Civil Rights Data.” 2021. [Www2.Ed.gov](https://www2.ed.gov/about/offices/list/ocr/data.html). January 15, 2021. <https://www2.ed.gov/about/offices/list/ocr/data.html>.

and candy, drug possession for carrying a maple leaf, to battery on a police officer for a five-year-old with ADHD having a tantrum.<sup>42</sup> This can lead to students having a more difficult time applying to colleges, scholarships, and jobs, given they would have a criminal record. Resource officers also carry the burden of building trust within their communities, however, there is a deep divide between law enforcement and community members. This distrust can be also built upon the fact that nearly 1/3 of students arrested at school are black, an incredibly high figure as that is double their share of enrollment,<sup>43</sup> further dividing the gap between communities and law enforcement agencies. Schools with a higher presence of SROs in fact have higher rates of exclusionary discipline like suspensions and expulsion.<sup>44</sup> This can lead to lower academic achievement of students and if the goal is to keep students in the classroom safe, a higher rate of policing in schools can in fact have an adverse effect. The notion of hardening schools in the name of safety, although well-intended, has proven statistically to have adverse effects on the student population. There is, however, merit in the notion of proactive responses to these events to prevent them from happening in the first place. Investing in schools in order to preemptively deter these targeted attacks could be more effective in the future.

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<sup>42</sup> Whitaker, Amir. 2019. “Cops and No Counselors How the Lack of School Mental Health Staff Is Harming Students Acknowledgements.” ACLU. ACLU. <https://www.aclu.org/report/cops-and-no-counselors>

<sup>43</sup> “An Overview of Exclusionary Discipline Practices in Public Schools for the 2017-18 School Year U.S. Department of Education Office For Civil Rights Civil Rights Data Collection.” 2021. U.S. Department of Education Office for Civil Rights. <https://www2.ed.gov/about/offices/list/ocr/docs/crdc-exclusionary-school-discipline.pdf>.

<sup>44</sup> Kupchik, Aaron. 2020. “Research on the Impact of School Policing.” ACLU Pennsylvania. August 2020. <https://fisafoundation.org/wp-content/uploads/2020/08/Research-on-School-Policing-by-Aaron-Kupchik-July-2020.pdf>.

## Reactive Response

### Law Enforcement Response

These shootings do happen, time and time again and unfortunately until major corrections are made in the realm of public safety, they will continue to happen. Therefore, there must be an analysis of the reactive responses we as a society have when these events occur. Firstly, there must be an examination of the law enforcement response to an active school shooter situation, the brave men and women who put their life on the line in the name of public safety. Their job is getting increasingly difficult with the United States seeing a rise in public shootings, in 2021 alone there was an average of more than one per week nationwide. The slow response time of the Uvalde police department during the active shooter situation at Robb Elementary School sparked a national discussion about the response of police during these situations. It took law enforcement 1 hour and 15 minutes to respond to the shooting, waiting outside of the school. In that time 19 students and 2 teachers were killed.<sup>45</sup> After this event, discussions around police response to these situations rose to the forefront of the topic of school safety. A study by the ALERRT Center found that out of 433 active shooter situations, over 57% ended before police arrived at the scene.<sup>46</sup> Instances when they do get to the situation statistically end by either subduing or shooting the suspect. However, a slow response time can be detrimental, leading to more casualties. The Federal Bureau of Investigation found that the mean response time for law

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<sup>45</sup> Oxner, Reese. 2022. "What We Know, Minute by Minute, about How the Uvalde Shooting and Police Response Unfolded." The Texas Tribune. May 28, 2022. <https://www.texastribune.org/2022/05/27/uvalde-texas-school-shooting-timeline/>.

<sup>46</sup> "ALERRT Active Attack Data." n.d. ALERRT Active Attack Data. <https://www.activeattackdata.org/index.html>.

enforcement to arrive on the scene is 3 minutes.<sup>47</sup> This, however, does not mean these situations last 3 minutes, this does not consider the time it takes the police to be called, or for dispatch to alert the proper authorities, and the many other factors that contribute to police not being on the scene fast enough. There is in fact a tragic history of slow response times.

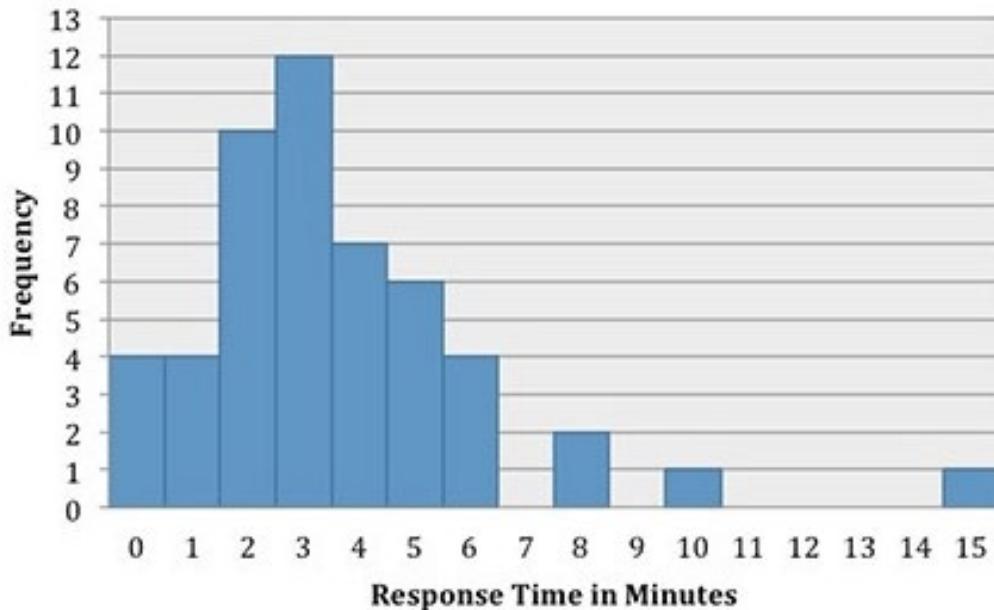


Figure 7: Police Response Time to Active Shooter Attacks (Source: Federal Bureau of Investigation)

In the Parkland shooting at Stoneman Douglas, from the shot, it took 17 minutes for law enforcement to be at the school. At that time 17 people were fatally shot. In the Sandy Hook shooting it took officers 8 minutes from the initial 911 call to enter the building, in that time 20 students and 6 employees were fatally shot. In the incident of Columbine, 13 victims were killed in the 13 minutes it took law enforcement to respond.<sup>48</sup> It can be concluded that during these events, a lot of damage can happen, incredibly fast. Almost too fast to respond, but every effort

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<sup>47</sup> Police Response Time to Active Shooter Attacks. n.d. Accessed December 13, 2022. <https://leb.fbi.gov/image-repository/police-response-time-to-active-shooter-attacks.jpg/view>.

<sup>48</sup> Diaz, Jaclyn. 2022. “The Tragic History of Police Responding Too Late to Active Shooters.” NPR, June 6, 2022, sec. Uvalde elementary school shooting. <https://www.npr.org/2022/06/06/1102668326/uvalde-police-response-school-shootings>.

should be made to respond quickly in order to protect the lives of students but is not always the most reliable or effective response to these situations and must be a part of a larger course of action to ensure safety and not the sole response.

### Run, Hide, Fight



Figure 8: Run, Hide, Fight (Source: Orange County Texas)

Run, Hide, Fight. That is the lesson taught in schools in order for students to attempt to be safe in the event of an active shooter emergency. The fact that time must be taken from students learning in order to be safe during a situation like this is heartbreaking enough, but nonetheless necessary to have effective responses to an active shooter situation. The principles are simple enough so that everyone can remember what to do. Run: if there is an opportunity to leave the situation safely experts recommend this course of action. It would lower the number of potential victims and allow individuals to call 911. Hide: if the shooter is within close proximity, it's best to find cover and hide. Barricading entryways and locking doors to prevent someone from coming in. Fight: when absolutely necessary, the last option is to fight, using any heavy

objects or anything to protect yourself against an active shooter could save lives.<sup>49</sup> This mantra is easy enough to remember that in a high-stress environment civilians without training can better protect themselves and this is a good start in the right direction in school safety. It's an indicator that the safety of the community takes community action and vigilance in order to keep everyone safe.

It does have its drawbacks though, and outdated safety practices can leave students at risk. Some experts argue that hiding in areas like under a student desk, a common practice for bomb or earthquake drills, does not translate well to an active shooter scenario.<sup>50</sup> If hiding under desks is a common practice, this could leave students vulnerable and easy targets. This is an indicator that the classroom is not conducive to being a defensible position in the event something happens. In these high stress situations, even a simple task like locking the door can be difficult to achieve as motor skills become harder to control. Effective methods to shelter in place are critical in keeping the classroom safe. Advancements in technology and efforts to make the classroom more defendable are being made in the wake of increased gun violence in schools. Every effort must be examined in order to find the best methodologies to keep students safe.

## Social Media and News

The phrase “thoughts and prayers” is said time and time again. Unfortunately, it's not enough to combat the issue faced in school safety. There must also be an examination of the visceral and reflecting response social media and new networks have on covering this issue.

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<sup>49</sup> “ACTIVE SHOOTER HOW to RESPOND.” 2008. ACTIVE SHOOTER HOW to RESPOND, October. [https://www.dhs.gov/xlibrary/assets/active\\_shooter\\_booklet.pdf](https://www.dhs.gov/xlibrary/assets/active_shooter_booklet.pdf).

<sup>50</sup> LLOYD, WHITNEY. 2018. “Schools Preparing for Active Shooters the Wrong Way, Experts Say.” ABC News. ABC News. February 28, 2018. <https://abcnews.go.com/US/schools-preparing-active-shooters-wrong-experts/story?id=53360957>.

There is a responsibility not only to the audience but also to the communities affected by these events. Arguments are made that media coverage sensationalizing the shooter rather than focusing on the victims inspires copycats. Dr. Adam Lankford of the University of Alabama, an expert in Criminology and mass shootings, concluded that extensive media coverage on the shooter will inspire others to achieve the same notoriety.<sup>51</sup> These studies found that the more casualties an event causes, the more coverage the shooter gets. In the mind of the shooter, this is fame and recognition, an inherent driving factor and reasoning for them to commit these acts. The American Psychological Association recommends that media cognition is a key factor in what's causing higher rates of shootings to occur in schools and media coverage should limit the amount of attention a shooter gets when covering these stories.<sup>52</sup> Several campaigns have begun nationwide in efforts to not spread the names of these infamous shooters as a means of deterrence, campaigns like “Don’t Name Them” and “No Notoriety”. The power of social media is something to not be understated, it has the power to influence elections, spread good and bad information quickly, and share stories worldwide. These digital platforms account for 52% of news coverage in today’s society.<sup>53</sup> The power of this tool cannot be overstated, and it is critical that all platforms are taken into consideration when examining the responsibility of the media in regard to covering these stories. In today’s world of getting fame quickly, it’s unfortunate that some would resort to these acts of violence, and there is an inherent responsibility to not lose focus on who matters most in these situations, the victims and the communities affected.

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<sup>51</sup> Lankford, Adam, and Eric Madfis. 2018. “Media Coverage of Mass Killers: Content, Consequences, and Solutions.” *American Behavioral Scientist* 62 (2): 151–62. <https://doi.org/10.1177/0002764218763476>.

<sup>52</sup> Mills, Kim. 2016. “‘Media Contagion’ Is Factor in Mass Shootings, Study Says.” [Https://Www.apa.org](https://www.apa.org), 2016. <https://www.apa.org/news/press/releases/2016/08/media-contagion>.

<sup>53</sup> \_\_\_\_\_. 2021. “Roughly Half of Americans Prefer to Get News on a Digital Platform; about a Third Prefer TV.” Pew Research Center. January 11, 2021. [https://www.pewresearch.org/fact-tank/2021/01/12/more-than-eight-in-ten-americans-get-news-from-digital-devices/ft\\_2021-01-12\\_socialmedia\\_02/](https://www.pewresearch.org/fact-tank/2021/01/12/more-than-eight-in-ten-americans-get-news-from-digital-devices/ft_2021-01-12_socialmedia_02/).

# Chapter 4: Educational Needs of Today

Educators today face many growing challenges to creating effective teaching environments. They have learned more about more effective ways to teach students and foster environments for collaboration, and wellness better suited to serve the students of today. However, many of these educators lack sufficient supplies, space, and equipment to make their jobs easier. K-12 teachers in 2022 who are “very satisfied” with their jobs have hit an all-time low of 12%, down from 39% just 10 years prior.<sup>54</sup> Many educators have their own funds and supplies to teach their students. An investigation must be done to better understand the position educational institutions are currently in and what can be incorporated in this thesis to create better educational spaces that serve its occupants.

## New Technologies

Technology has become an integral part of our culture in the 21st century. It has changed the way we interact, and learn, and made the world a much smaller place with information traveling at record speeds. Integrating technologies into schools

Computers for students are proving to be an integral part of their learning process and can provide many benefits. Studies have shown that students with access to computers instead of traditional pen-and-paper learning environments are more student and group focused

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<sup>54</sup> Will, Madeline. 2022. “Teacher Job Satisfaction Hits an All-Time Low.” Education Week, April 14, 2022, sec. Teaching Profession. <https://www.edweek.org/teaching-learning/teacher-job-satisfaction-hits-an-all-time-low/2022/04>.

emphasizing collaboration and cooperation.<sup>55</sup> Many schools with adequate resources have embraced the use of technology. In 2014, 31%-33% of schools supplied their students with internet-capable devices depending on their grade level. This is an upward trend compared to the 10% in 2011.<sup>56</sup> In 2019-2020 45% of schools reported giving students their own computers.<sup>57</sup> This increase in computer-based learning can lead to students accessing more information faster, in a more information-based society.

This increase in computer learning must be monitored. Not all results have been positive. There has been links to an increase in lack of attention, obesity, cyberbullying, a decrease in physical activity, and sleep problems.<sup>58</sup> An over-reliance on the wrong technologies can prove counterproductive. This is why pulling students away from the computer and focusing on collaborating in person is essential to an effective hybrid environment.

### Flexible Furniture

One-way educators can create more effective in-person learning environments is through flexible furniture. There is an ongoing debate within the educational world as to the best method for arranging classroom desks and the seating arrangement of students. Some advocate for a

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<sup>55</sup> Snyder. 1993. “The Impact of Computers on Students’ Writing: A Comparative Study of the Effects of Pens and Word Processors on Writing Context, Process and Product.” *Australian Journal of Education*, 37 (1). [https://journals.sagepub.com/doi/abs/10.1177/000494419303700102?casa\\_token=hvQKFxjrDtEAAAAA%3AGZ8VmrvVQbq48ncZ8UW5jL4e0nXtnHCDZmx53EVEkWbJOKXzAb917C0S7hm6xBHO667Dug1ktO-9Cu&](https://journals.sagepub.com/doi/abs/10.1177/000494419303700102?casa_token=hvQKFxjrDtEAAAAA%3AGZ8VmrvVQbq48ncZ8UW5jL4e0nXtnHCDZmx53EVEkWbJOKXzAb917C0S7hm6xBHO667Dug1ktO-9Cu&)

<sup>56</sup> Nagel, David. 2014. “One-Third of U.S. Students Use School-Issued Mobile Devices -- the Journal.” *THE Journal*. April 8, 2014. <https://thejournal.com/articles/2014/04/08/a-third-of-secondary-students-use-school-issued-mobile-devices.aspx>.

<sup>57</sup> Gray., Lucinda. 2021. “Use of Educational Technology for Instruction in Public Schools: 2019–20 First Look.” Institute of Education Sciences, November. [https://drum.lib.umd.edu/bitstream/handle/1903/28835/Campbell\\_umd\\_0117N\\_22600.pdf?sequence=2&isAllowed=y](https://drum.lib.umd.edu/bitstream/handle/1903/28835/Campbell_umd_0117N_22600.pdf?sequence=2&isAllowed=y).

<sup>58</sup> Mustafaoglu, Rüstem, Emrah Zirek, Zeynal Yasaci, and Arzu Razak Özdingler. 2018. “The Negative Effects of Digital Technology Usage on Children’s Development and Health.” *Addicta: The Turkish Journal on Addictions* 5 (2). <https://doi.org/10.15805/addicta.2018.5.2.0051>.

more traditional style for rows and columns. All students see are the teacher and the back of the student's head in front of them. While this encourages less conversation amongst the students and is generally better for lectures, they do not facilitate discussion or collaborative learning and many teachers are moving away from this style of classroom setup. Others advocate for more unconventional layouts: U-shaped, pair pods, roundtables, and others each with their own benefits and drawbacks. One style that many teaching professionals advocate for are clusters or group pods. Typically, in groups of four, this style of classroom setup is effective for collaboration, and students bonding with each other and can work in a variety of classroom sizes.<sup>59</sup> Whatever style setup a teacher decides to use, having the flexibility to choose is essential in the 21st-century classroom.

This is why flexible and modular furniture can be a great benefit to accommodating the needs of students today. Furniture that can be moved to better suit each educator and their classrooms can encourage and accommodate different learning environments, and much more effectively allow students to cooperate and engage with their learning environments. It has been shown that classrooms that can accommodate different learning environments have proven to promote better well-being and mental health for students with a higher rate of success.<sup>60</sup> As society pivots into more collaborative learning and working environments, it's important to take a look at the physical environment of the classroom. By understanding the needs of educators and students, the classroom can be better equipped to handle the needs of today.

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<sup>59</sup> Yale University. 2013. "Classroom Seating Arrangements | Poorvu Center for Teaching and Learning." Yale.edu. Yale University. 2013. <https://poorvucenter.yale.edu/ClassroomSeatingArrangements>.

<sup>60</sup> Bluteau, Jonathan, Solène Aubenas, and France Dufour. 2022. "Influence of Flexible Classroom Seating on the Wellbeing and Mental Health of Upper Elementary School Students: A Gender Analysis." *Frontiers in Psychology* 13 (May). <https://doi.org/10.3389/fpsyg.2022.821227>.

## Funding

One challenge most schools face is the issue of funding. Having the necessary financial resources allocated to public schools is. 48% of the financial resources for schools is generated through state resources such as income and sales tax. Another 44% is contributed by the local community such as property tax. The remainder comes from federal funding such as grants.<sup>61</sup>

There is an ongoing discussion regarding the amount of funding schools receive, if there is enough of it, and where the money goes. This discussion varies by each state and is more nuanced as it can vary based on the demographics of the students served within the school. Current findings suggest that low-income and predominantly minority student schools receive less funding than those either in higher-income or predominantly white districts.<sup>62</sup> This would make sense as over 90% of the school's funding resources come from the state and local levels. However, this puts a large portion of students at a disadvantage academically, simply based on their economic status.

Take the Baltimore school system as an example. With a total of 77,807 students enrolled in the 2021-2022 school year, 90% of students are either Black or Hispanic. And over 60% fall under low-income status.<sup>63</sup> Additionally, the median household income for Baltimore City is \$52,164, less than the national average of \$64,994 and even less compared to the state of

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<sup>61</sup> Park, Jennifer. 2007. "School Finance." Education Week. December 6, 2007. <https://www.edweek.org/policy-politics/school-finance/2007/12>.

<sup>62</sup> Allegretto, Sylvia, Emma Garcia, and Elaine Weiss. 2022. "Public Education Funding in the U.S. Needs an Overhaul: How a Larger Federal Role Would Boost Equity and Shield Children from Disinvestment during Downturns." Economic Policy Institute. July 12, 2022. <https://www.epi.org/publication/public-education-funding-in-the-us-needs-an-overhaul/>.

<sup>63</sup> "District Overview | Baltimore City Public Schools." n.d. [Www.baltimorecityschools.org/district-overview](https://www.baltimorecityschools.org/district-overview).

Maryland with an income of \$87,063.<sup>64</sup> This would statistically put Baltimore City students at a disadvantage academically, and it shows. 41% of Baltimore high school students earn below a 1.0-grade point average.<sup>65</sup> Not only does this affect the upper levels of education but greatly impacts the earlier levels as well. Project Baltimore discovered that in 2021 the fourth-grade reading level went down to 193, a shocking low compared to the state average of 220 and the national average of 219.<sup>66</sup> With such poor performance, it is critical that adequate funds are utilized to further student education. This is not just an issue of how much money is being used by the schools but also how it's being used. School costs are based on a per-student basis. Baltimore City spends nearly \$16,000 per student. Better results are seen with districts that spend more money per student, like Boston which spends \$25,653. Better results are also seen in cities like Miami and Houston that spend less than \$10,000 per student.<sup>67</sup> There are many factors that can contribute to this including the cost of living, household income, education, and racial demographics. Nonetheless, there is a connection between the amount of funding spent on students and their performance.

This is where the built environment can make an impact. By providing a more cost-efficient and sustainable school, money spent on students can be redirected to student success rather than operational costs. If the school is designed with savings in mind, long-term savings can have a more positive impact on students.

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<sup>64</sup> “Baltimore City, MD | Data USA.” n.d. Datausa.io. Accessed December 13, 2022. <https://datausa.io/profile/geo/baltimore-city-md#:~:text=Households%20in%20Baltimore%20city%2C%20MD%20have%20a%20median%20annual%20income.>

<sup>65</sup> Papst, Chris. 2021. “State Delegate Calls for Firings as 41% of Baltimore High Schoolers Earn below 1.0 GPA.” WBFF. July 14, 2021. <https://foxbaltimore.com/news/project-baltimore/state-delegate-calls-for-firings-as-41-of-baltimore-high-schoolers-earn-below-10-gpa.>

<sup>66</sup> \_\_\_\_\_. 2021b. “Baltimore City Schools Hits New Low in Nationwide Testing.” WBFF. October 11, 2021. <https://foxbaltimore.com/news/project-baltimore/baltimore-city-schools-new-low-nationwide-testing-naep.>

<sup>67</sup> Ibid.

## Growing Classes

Another factor that influences students and educators is their classroom sizes. Between 1980 and 2008 the national ratio of public-school students to teachers fell from 17.6 to 15.8.<sup>68</sup> Smaller classes have proven to be more beneficial for not only the student's education but the teacher's ability to connect with students one on one. Ideally, 15 students per teacher is an adequate ratio, however, due to many budget constraints, the trend of classroom sizes has gone up significantly since 2008. Currently, the Department of Education estimates that the average classroom size is 25 students to 1 teacher.<sup>69</sup> This astronomical growth in classroom size puts the students' learning at risk as well as the educator's ability to deal with the stresses of the job. All while being in a classroom not designed to handle such a large number of students. Providing spaces that can accommodate student learning styles and a much higher number of students to make the educator's job easier is essential to adjusting to this new era of education.

## Chapter 5: Architecture and The Human Experience

The aftermath of a school shooting can affect everyone, regardless of age. As the epidemic of this issue grows, there must be an analysis of the best responses to this situation, to better understand the best ways to support the mental health of the communities after such a tragedy. Mental health has now become a more common topic of discussion regarding the overall health of individuals, and the traumatic experience surviving students and community

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<sup>68</sup> Sparks, Sarah D. 2010. "Class Sizes Show Signs of Growing." *Education Week*, November 24, 2010, sec. School & District Management. <https://www.edweek.org/leadership/class-sizes-show-signs-of-growing/2010/11>.

<sup>69</sup> Ibid.

members go through can have a devastating impact on that. Understanding this and learning the best way to support the mental and emotional health of communities after these events.

### Support for Students

One of the main principles to understand when analyzing the outreach and response to a mental health crisis is that each community is different. Each community these events happen in have their own set of values, ideals and beliefs so there is no one proper response that works for all. The responses must be tailored to each community to be effective.

There are some guiding principles parents and communities can use in order to better cope with the trauma of these events. Firstly, limiting access to media coverage about the event can help ease the fear and anxiety. These outlets can cause the healing process to be prolonged if they are constantly reminded about the event. Secondly, returning back to their regular routine as quickly as possible, is essential to overcoming the mental barrier these events create. While it may be a show of support to provide time off or special opportunities, it can unintentionally be a reminder of the events. Having the capability to return to a regular or at least a modified routine can greatly impact students. As seen during the COVID-19 pandemic, students are able to adapt to an online learning environment. A school that can provide this type of learning environment can be beneficial to students returning to their normal routines.

Lastly, facilitating a space for students to process their emotional health is vital to the student's well-being. Having access to local providers of support (counselors, parents, etc.) can drastically influence an adolescent's behavior. National or international experts can provide guidance and expertise to local providers on the best methods of long-term intervention to ensure

the best care is provided<sup>70</sup>. By having both national expertise and local influence, survivors and those affected are able to have sustainable support over a longer period of time.

It takes a village to raise a child. A common phrase no more appropriate than when addressing the issue of overcoming gun violence in schools. Creating spaces where mental healthcare is possible is vital to the development of students and can build stronger bonds with their community. These bonds of local communities are what holds the line when these attacks occur. When designing a school, it is essential to think of not only the students and faculty, but also how those in the community interact with the school. The parents, healthcare professionals, law enforcement, and other locally influential people in students' lives must be taken into account when making design decisions for creating a school for the 21st century.

### Architecture and Well-Being

Understanding the effect of the built environment has on the human experience is a major factor in the issue of gun violence in schools. The American Institute of Architects (AIA) recognizes health as one of its priorities for advancing the field of architecture, affirming that licensed architects and affiliated design professionals have, in their professional practice, a positive duty to protect the public's health, safety, and welfare<sup>71</sup>. Health including physical, emotional, and social well-being. This leads to the understanding that while safety is a major factor in school design, so is the overall well-being of its occupants and the architecture in which these students and community occupy plays a major role in that process.

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<sup>70</sup> "Crisis Management Following a School Shooting." n.d. Center for Violence Prevention. <https://violence.chop.edu/types-violence-involving-youth/school-shootings/crisis-management-following-school-shooting>.

<sup>71</sup> "Health, Safety and Welfare Units - AIA." n.d. Www.aia.org. <https://www.aia.org/pages/3281-health-safety-and-welfare-credits>.

The AIA promotes six key themes when designing with well-being in mind: environmental quality, natural systems, physical activity, safety, sensory environments, and social connectedness.<sup>72</sup> These key concepts, when incorporated into a design, can greatly improve the mental health and well-being of occupants. The AIA provides several design principles to keep in mind when focusing on a set of best practices.

- Natural and Artificial Lighting

- Mechanical and electrical systems create a further separation from the occupants and the outside world. This separation from nature creates a negative impact on mental and physical health. Allowing for natural daylighting from the sides as well as above creates even lighting. Democratized daylighting by allowing it to affect the largest groups of people. Design with daylighting as the primary source of lighting, with artificial as the supplementary. Utilizing an East-West orientation maximizes daylighting and minimizes solar heat gain. Using materials to reflect daylighting allows light to fill the deeper spaces of a building. Incorporating ambient and dynamic lighting for preferred lighting levels. Minimizing glare that creates too much contrast between light and dark spaces and using light as an architectural element.

- Thermal Comfort

- Thermal comfort can have a positive impact on health and productivity. Utilize methods for controlling solar heat gain, optimal insulation, window spacing and eliminating thermal bridges. Provide methods to evenly distribute temperatures

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<sup>72</sup> “AIA.” 2022. Aia.org. 2022. <https://www.aia.org/pages/3461-aias-design-health-initiative>.

and include radiant systems for heating and cooling. Allow for individual control over the immediate environment with operable windows, thermostats and fans.

- Indoor Air Quality

- Keeping the indoor air quality high minimizes dirt, dust and pollutants from entering the building. Establish smoke-free environments and allow for operable windows and 100% outside air systems. Use no VOC interior finishes and avoid flame retardants and other chemicals.

- Mental and Social Well-being

- Establishing built environments where all feel welcome is essential to design. This encourages trust and camaraderie between occupants, reducing stress and anxiety. Create interior and exterior arrangements that provide space for informal social interaction like porches, seating on pathways, and large stairs. Provide support spaces like health and cultural suites. Ensure that all people of age, size and ability can freely move throughout the building as best as possible. Provide views to vegetation and greenery incorporating biophilic design strategies.

- Acoustics

- Human-centric design includes a clear audio perception of the environment. Poor acoustical quality of a space can drastically changes the way people feel within a space. Creating a sound map to color code zones designated for loud or quiet audio levels can lead to finding problem areas before they arise. Utilizing acoustical panels to absorb sound and determining ideal audio levels for rooms can influence material choices.

- Movement /Exercise

- Having a logical flow to a building encourages physical activity. Making utilitarian aspects designed well like stairs can encourage movement but must provide an equitable experience to those with ability challenges. Provide comfortable furniture and seating areas for rest and equipment for exercise if allowed. Accommodate multiple modes of transportation like bicycles, with fix stations, racks and storage. Include numerous play areas for the community as well as accommodate pets and the necessary facilities.
- Nourishment
  - Encourage proper nutrition and dietary habits can greatly improve a buildings occupant. Good design can encourage healthy habits and must have the ability to store food made on-site and brought off-site by the occupants. Allocate space for on-site food preparations like kitchens or kitchenettes. Ensure there is adequate and pleasant seating for people to eat and provide water bottle stations. Garden spaces on-site can also greatly improve the food provided.

Each of these best practices can drastically improve the built environment of a school and wellbeing of its occupants. By incorporating these design interventions into a school, the overall wellbeing of students, faculty, and community can improve as well. This can reduce the risk of mental and physical health of students, improving their academic performance and social wellbeing. Making design decisions with a high impact are the responsibilities of the architect. Shaping spaces and the built environment has more impact than many of the occupants will ever realize. The physical and mental boundaries created from the building drastically influence the experiences occupants have.

# Chapter 6: Principles of School Design

The average age of many school buildings in the United States is around 44 years old.<sup>73</sup>

Signs of these aging and decaying classrooms can be seen in many aspects of the classroom. The principles in which these outdated classrooms were designed are not only insufficient from a safety standpoint but fail to deliver 21st century education. These traditional schools are no longer equipped to deliver effective instruction and engagement with students and in fact can prevent instructors from successfully delivering a great education.

According to Prakash Nair of the Harvard Education Letter, there are 20 Modalities of Learning. A series of unique learning environments for students to experience to facilitate their education. These modalities include:

- |  |                                |
|--|--------------------------------|
| 1. Independent study                   | 9. Student presentations       |
| 2. Peer-to-peer tutoring               | 10. Internet-based research    |
| 3. One-to-one learning with<br>teacher | 11. Roundtable discussions     |
| 4. Teacher lecture                     | 12. Performance-based learning |
| 5. Team collaboration                  | 13. Interdisciplinary study    |
| 6. Project-based learning              | 14. Naturalist learning        |
| 7. Distance learning                   | 15. Art-based learning         |
| 8. Learning with mobile<br>technology  | 16. Social-emotional learning  |
|  | 17. Design-based learning      |
|  | 18. Storytelling               |

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<sup>73</sup> Alexander, Debbie. 2014. "Condition of America's Public-School Facilities: 2012 -13 First Look." National Center for Education Statistics. National Center for Education Statistics. <https://nces.ed.gov/pubs2014/2014022.pdf>.

19. Team teaching and learning

20. Play- and movement-based

learning

These modalities allow for a variety of teaching activities, affording all students the ability to learn and grow in an environment conducive to their learning styles. Traditional schools fail to accommodate more than two of these learning styles, lectures and presentations.<sup>74</sup> These traditional modes of learning require students to learn independently, failing to recognize that many students would not opt for this type of learning.

### Cells and Bells

Many schools historically have opted for a “cells and bells” approach to learning. The traditional cell of a classroom until the bell rings and prompts students to move to the next cell. Learning was taught in a one-dimensional linear fashion in a passive fashion all under the teacher’s control. Students sit in perfect grids, only looking at the back of the head of the student in front of them. These rectangular and boxed designs were reminiscent of the Ford Model production line.<sup>75</sup> A one size fits all approach to teaching with minimal interaction between students. This approach is known as sociofugal.

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<sup>74</sup> Nair, Prakash. 2014. “From ‘Cells and Bells’ to Learning Communities.” Harvard Graduate School of Education. Harvard Education Letter. September 2014. <https://prakashnair.com/wp-content/uploads/2020/03/From-Cells-and-Bells-to-Learning-Communities.pdf>.

<sup>75</sup> Romano, Brenda. 2015. “The End of Cells & Bells: School Design in the 21st Century - Virtual Builders Exchange.” Virtual Builders Exchange. July 31, 2015. <https://www.virtualbx.com/industry-news/end-cells-bells-school-design-21st-century/>.

## Sociofugal

Dr. Humphry Osmond coined the term after observing the effects environmental changes have on people. Sociofugal or a grid like structure, keeps people apart, suppressing communication and does not allow for collaboration<sup>76</sup>. While this may be beneficial in a testing environment, in today's world of collaboration and networking, this type of environment is not conducive for the day-to-day operations of the classroom. This can also be applied to larger scales other than furniture arrangements. Creating classrooms that are in a sociofugal pattern can also limit the interactions classes have with other classes, unable to facilitate large scale collaboration efforts. By having classrooms lined up one after another like cells in a prison with little room for interaction, this linear or outward focused approach to designing spaces limits social interaction ultimately impeding on students' ability to learn effectively.

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<sup>76</sup> "Sociofugal vs Sociopetal Space." 2008. Design for Service. February 9, 2008.  
<https://designforservice.wordpress.com/2008/02/09/sociofugal-and-sociopetal-space/>.

## Learning Communities

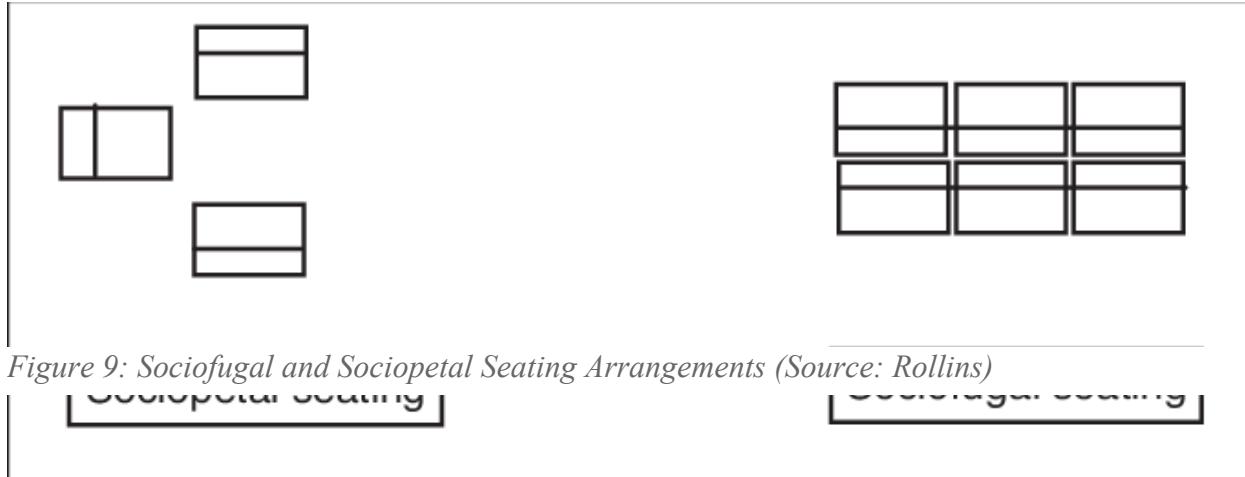


Figure 9: Sociofugal and Sociopetal Seating Arrangements (Source: Rollins)

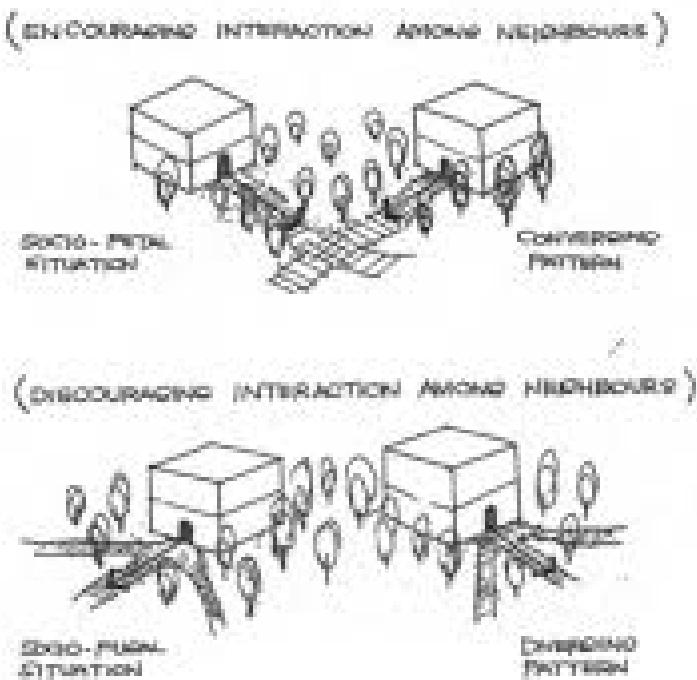
Creating a safe environment for students involves more than just protecting from gun violence. It is about fostering a learning environment and establishing a sense of community, for the students and faculty. This sense of togetherness and belonging comes from teamwork, collaborative efforts, and sharing the same space. This is why it is critical to design the built environment with collaboration and social development in mind.

### Sociopetal

While sociofugal may not be the best learning environment, sociopetal can offer an alternative design solution to facilitate a learning environment that can accommodate more learning modalities. Humans are by nature social beings. There is a biological necessity for creating physical spaces for collaboration, social interaction, development, and self-actualization. Sociopetal designs the built environment to promote social interaction and engagement. Spaces with sociopetal design choices tend to be radial rather than grided and utilize clusters of shared

workspaces as a means to promote collaboration<sup>77</sup>. When furniture, classrooms and spaces are designed to bring people together, this can enable other modalities of learning, providing students and educators with more opportunities for success.

### New Classrooms



*Figure 10: Entrance Orientation Techniques (Source: Bardessi)*

### Maker spaces

There are several opportunities that new schools today must provide students with. Offering different types of spaces, varied in many design aspects like sound control, lighting, and size can provide different types of spaces for comfort and education. Maker spaces allow students to engage in a more tactile type of learning. These spaces foster innovation and

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<sup>77</sup> Ibid.

problem-solving skills by allowing students to build and create their own inventions with hands-on experience. These spaces can include 3-D printing, woodshops, audio/visual supplies and other tools for creation.

### Quiet zones

Quiet zones are spaces dedicated to providing a calm and distraction-free environment affording students the opportunity to focus. Some students thrive in silence. These environments free of distractions are ideal for students with attention challenges or social anxieties, providing a safe space for test taking, reading, writing and other assignments. These can also be calming spaces for students experiencing emotional moments and provide them the opportunity to relax and calm down. This can avoid disruptions in the classroom and teach students self-soothing behaviors, developing their emotional wellbeing. These spaces are typically well defined in softer materials and colors, generally smaller in scale and minimized distractions.

### Collaboration zones

Collaboration zones are specific areas designed to promote multi-student engagement with group projects and activities, closely mimicking real world work environments. By allowing students to learn from each other, it provides students the opportunity to pool their



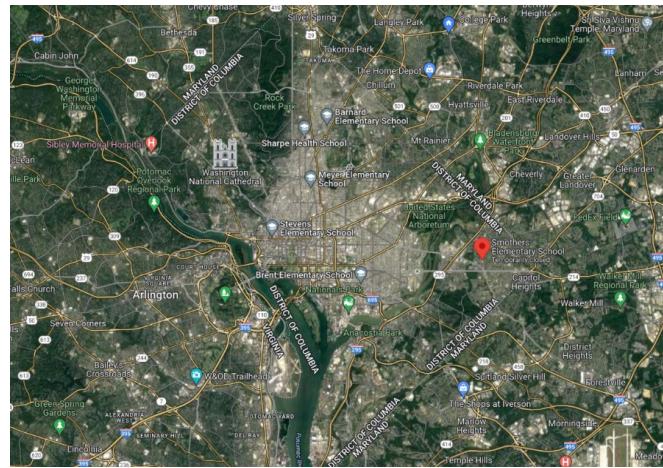
Figure 11: Co-Lab Space (source: GWWO Architects)

resources and knowledge together to create solutions. These zones also allow for multiple classes to work together. When these collaboration zones are in the halls, not only do they activate the corridors, but provide opportunities for students to work with other classes. By creating more informal learning spaces, education can happen in more places than just the classroom.

## Chapter 7: Site Analytics

Site selection for the most appropriate location to implement design efforts must take into account several factors, both physical and experiential. Two potential site locations were identified with both opportunities for improvement and site assets. Firstly, City Springs Elementary in Baltimore, Maryland. Located in an urban context that is currently a two-city block wide site, one block holding the current City Springs Elementary School, and the other holding an abandoned high school. The other potential site is Smothers Elementary School in Washington DC. A suburban elementary school undergoing renovations.

## Smothers Elementary, DC



*Figure 12: Smothers Elementary (Source: Author, Google Earth)*

Washington DC has seen a series of school closures over the past few years. The public school system of Washington DC has seen a large reorganization of schools including the closure of many, moving students to new buildings. While this was met with strong resistance from community members, the city did move forward with closing 13 schools.<sup>78</sup> While this could be seen as a disadvantage to the community, there could be benefits in the redevelopment of the schools selected to stay.

With a complete redesign of the selected schools, there can be more adequate space for students, rather than fitting more students into classes not meant for higher numbers. There is also the opportunity for creating a community icon through the architecture of the school. A well-designed school, geared towards serving the community, has a better chance of being

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<sup>78</sup> Chen, Grace. 2022. “D.C. Schools: Consolidation and Closures - PublicSchoolReview.com.” Public School Review. 2022. <https://www.publicschoolreview.com/blog/dc-schools-consolidation-and-closures>.

embraced by the community, allowing them to feel pride and a sense of ownership in a new school.

Established in 1923, located in East Washington DC Ward 7, Smothers Elementary School is currently undergoing renovation and additions for an increase in student enrollment. It was selected in the City's plan to stay. Located in a suburban context, this Pre-K through 5th grade school serves a predominantly black student body of about 200 students. About 74% of the student body are at risk and with an increase in student enrollment, a new building could serve this community well.

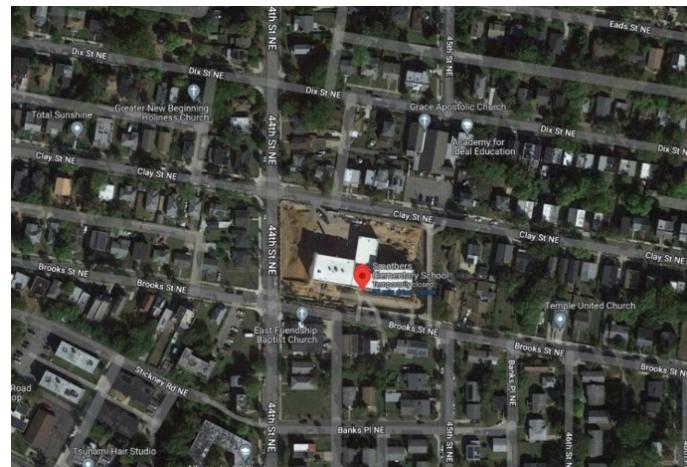


Figure 13: Smothers Elementary (Source: Author, Google Earth)

### City Springs Elementary/Middle, Baltimore

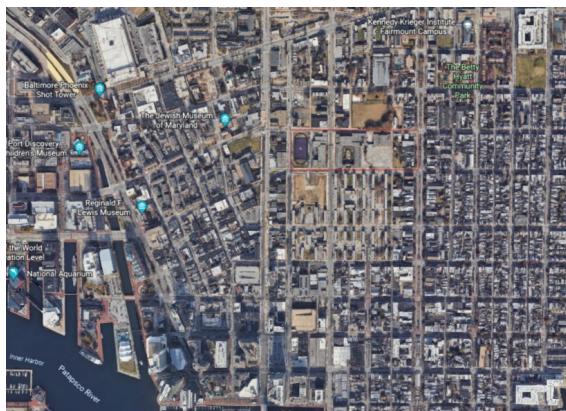


Figure 14: City Springs Elementary/Middle (Source: Author, Google Earth)

City Springs Elementary is located near the heart of Baltimore, Maryland. Falling under Baltimore City Public School System, this public charter school serves Pre-K through 8th grade and is operated by the Baltimore Curriculum Project<sup>79</sup>. With over 700 students this site presents a variety of opportunities.

<sup>79</sup> “City Springs Elementary/Middle School | Baltimore City Public Schools.” n.d. [Www.baltimorecityschools.org](http://www.baltimorecityschools.org). Accessed December 13, 2022. <https://www.baltimorecityschools.org/schools/8>.

This school is directly adjacent to the Perkins Homes neighborhood. A former public housing project currently undergoing a \$30 million renovation. These mini-city brick utilitarian homes that are over 85 years old will be replaced with an affordable mixed-use housing community. This redevelopment by Hord Coplan Macht seeks to reconnect the community's social network and neighborhood infrastructure with 1,345 new living units, a new park, retail and transit services across the 33-acre neighborhood<sup>80</sup>. City Springs Charter will fall under this

redevelopment plan, and its design could be critical in the development of the newly defined neighborhood. The site lends itself to be easily accessible to the new

community, allowing students to walk, take transit, or be dropped off without the need for a school provided bus system. The currently closed Baltimore Freedom Academy presents a new opportunity for development by providing a vacant lot and building next to the current school allowing for more development without displacing current occupants. The site is oriented on an



Figure 15: Perkins Homes Redevelopment (Source: Hord Coplan Macht)



Figure 16: Neighboring Places (Source: Author)

<sup>80</sup> "Perkins Somerset Oldtown CNI Transformation Plan." n.d. Hord Coplan Macht. Accessed December 13, 2022. <https://www.hcm2.com/projects/perkins/>.

East-West axis, making it ideal for taking advantage of natural daylighting efforts. There are also several institutions near the site including the National Aquarium, museums, and other civic institutions to aid in the students education. This site

could serve as a civic cornerstone that could define the gateway into the new neighborhood.

The site does present several challenges that must be considered in the design process. The total site being 1,048' across has a 28' elevation change. There is also a large imbalance of hardscape and concrete with little vegetation or greenspace on site. This site being located in Baltimore City is also at a higher risk of gun violence, the county with the highest gun violence deaths in the state.<sup>81</sup> This site is also located in a Black and minority community, who are 17 times more likely to die to gun

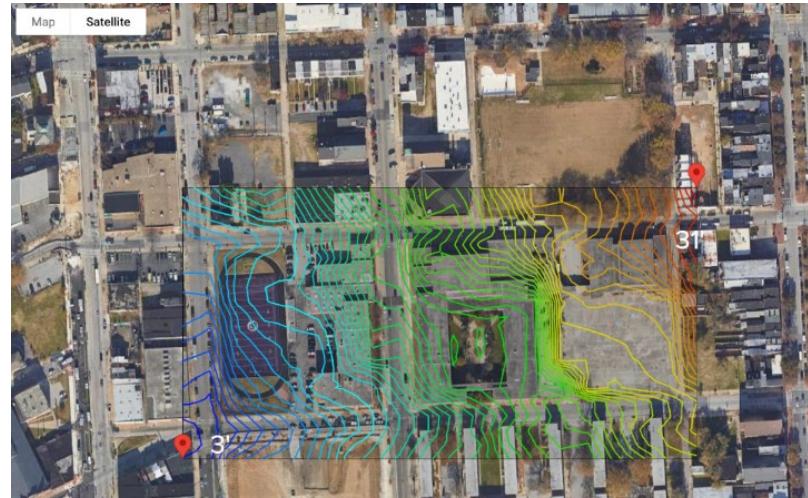


Figure 17: City Springs Topology (Source: Author)

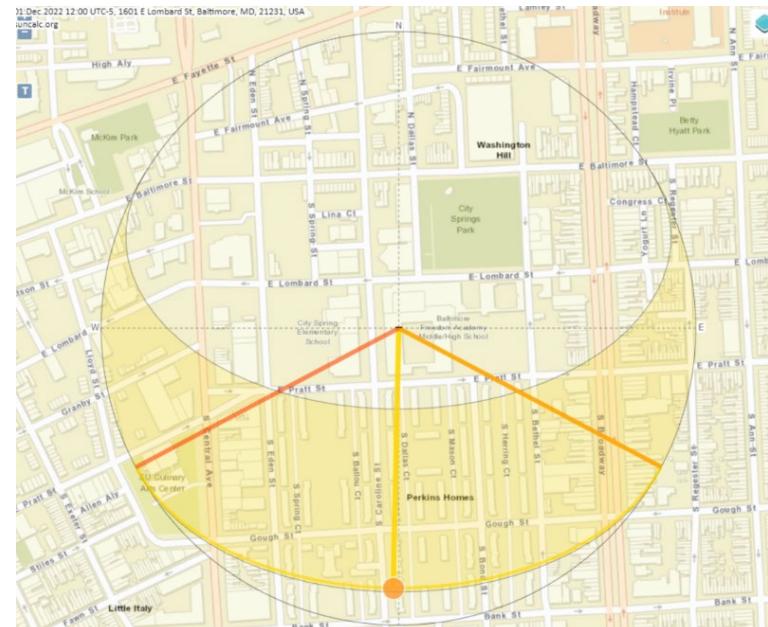


Figure 18: City Springs Sun Chart (Source: Author)

<sup>81</sup> "Maryland." n.d. The Educational Fund to Stop Gun Violence. <https://efsgv.org/state/maryland/>.

violence than white communities<sup>82</sup>. There is also the issue of the Baltimore City schools hitting all-time lows, well below the state and national averages.<sup>83</sup>

This serves as a reminder of why creating a safe and protected school is necessary for this location. By providing a community serving school, focused not only on safety but also better education, this site has the potential to positively redefine the majority black and minority community of Perkins Homes. This site desperately needs architectural intervention and will be the selected site for this thesis. Not only for its opportunities, but primarily for its challenges and needs for community-based architecture.

## Chapter 8: Design Solution

After many rounds of design iterations and research into the architecture where mass school shootings take place, there are key design flaws that have been exploited in these events that if changed could save lives. Firstly, after examining the shooter's path on Stoneman Douglas High School in Parkland, Florida, this incident demonstrated the dangers of straight narrow corridors. The shooter methodically traveled up and down each floor without ever needing to enter a classroom. This could partially be due to the narrow and linear corridor students were in.

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<sup>82</sup> "How Does Gun Violence Impact the Communities You Care About?" 2022. How Does Gun Violence Impact the Communities You Care About? <https://everystat.org/#Maryland>.

<sup>83</sup> Papst, Chris. 2021a. "State Delegate Calls for Firings as 41% of Baltimore High Schoolers Earn below 1.0 GPA." WBFF. July 14, 2021. <https://foxbaltimore.com/news/project-baltimore/state-delegate-calls-for-firings-as-41-of-baltimore-high-schoolers-earn-below-10-gpa>.

Stoneman  
Douglas  
Parkland, FL

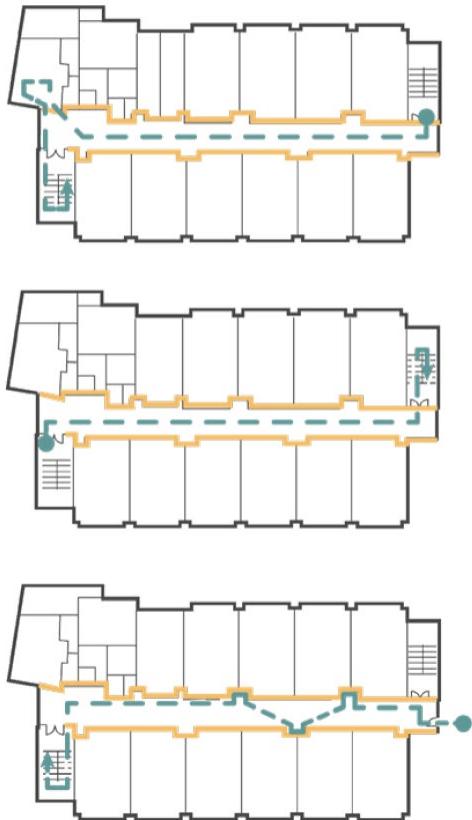


Figure 19: Stoneman Douglas Shooter Path (Source: Author)

Secondly, an analysis of Robb Elementary in Uvalde, Texas showed that the shooter was able to travel along the entire front of the school and still enter the building. This demonstrated the importance of natural surveillance of the façade and keeping constant visual connections both on the interior and exterior.

## Robb Elementary Uvalde, TX

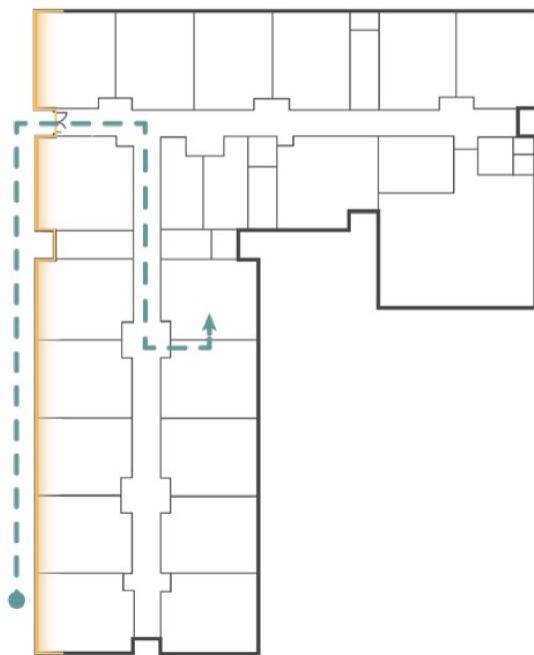


Figure 20: Robb Elementary Shooter Path (Source: Author)

Lastly, an analysis of Sandy Hook Elementary demonstrated the importance of the lobby and its relation to other programmed areas such as the office. The shooter was able to exploit a blind spot created in the lobby with the service areas up front near the lobby and with the office area tucked behind the lobby, the shooter was able to gain access to the school.

## Sandy Hook Newtown, CT

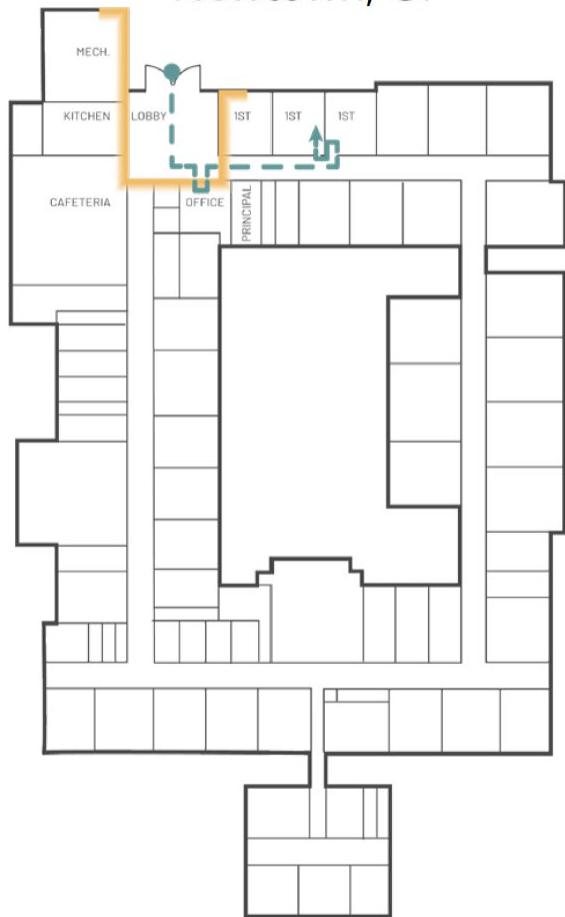


Figure 21: Sandy Hook shooter path (Source: Author)

With this analysis in mind, more proactive approaches to the design of schools could be implemented. There are three environments of design that must be focused on. First the physical environment or form. This focuses on increasing the transparency and visual connections of a space, as well as having access to safe exits around the building.

Second, is the social environment or function of space. This can be improved by utilizing a sociopetal configuration of classes and furniture to encourage collaboration and community.

Not only does this improve the methods of learning for children, but could avoid bullying and decrease the chances of students feeling outcasted.

Lastly, is the psycho-emotional or beauty of a space. When spaces are designed well and provide the beauty that's expected, they are maintained well and make occupants more willing to spend time in the space. A focus on biophilia and incorporating light and color into a space can improve the mental health of occupants.

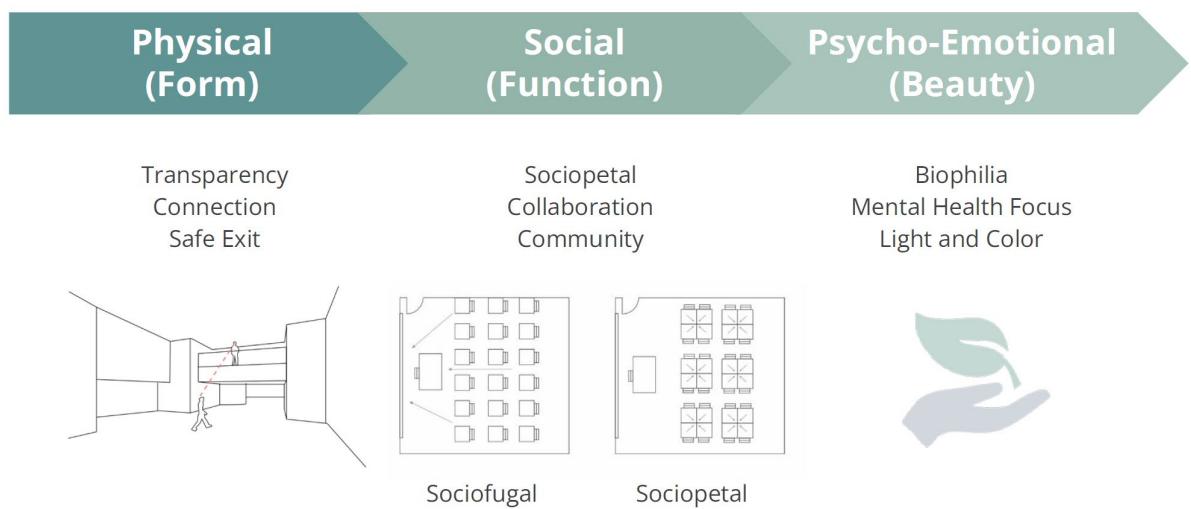
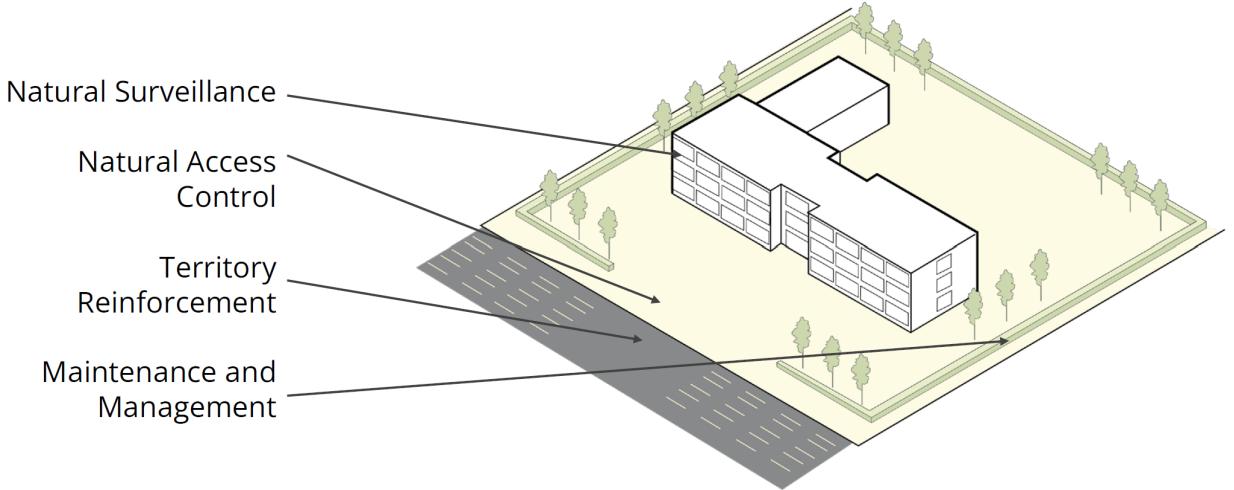


Figure 22: Environments of Design (Source: Author)

Another concept that must be incorporated in the design is Crime Prevention Through Environmental Design or C.P.T.E.D. This would allow for the surrounding landscape to work in favor of security for the building by reducing the prevalence of fear and crime in the area.



*Figure 23: Crime Prevention Through Environmental Design (Source: Author)*

Utilizing these key findings the next step was to incorporate urban tactics that allowed the new design to fit within the urban context. The first tactic was to connect the new park under development with the existing park across the street from the site with a pedestrian promenade. Second, was to maintain the urban fabric and build the school to hold the street edge, in particular the corner condition created by the new development. Thirdly, utilize a circular form on the interior to allow for a curvilinear hallway on the interior of the building and allow the building to protect and shelter the playground space. At the center of the radial figure would be a landmark that also bisects the promenade axis, and a fitting landmark would be a belltower, synonymous with schools.



*Figure 24: Urban tactics of design of new school (Source: Author)*

With these tactics being utilized, this puts the teaching wing of the school along the perimeter and play spaces in the northern part of the site. The library wing was then separated from the primary building to allow for operation during non-school hours as well as a secondary playground and auxiliary gym for the public. This then allowed for the bus and vehicle drop off to be located off East Pratt Street, which has lower level of vehicular traffic.

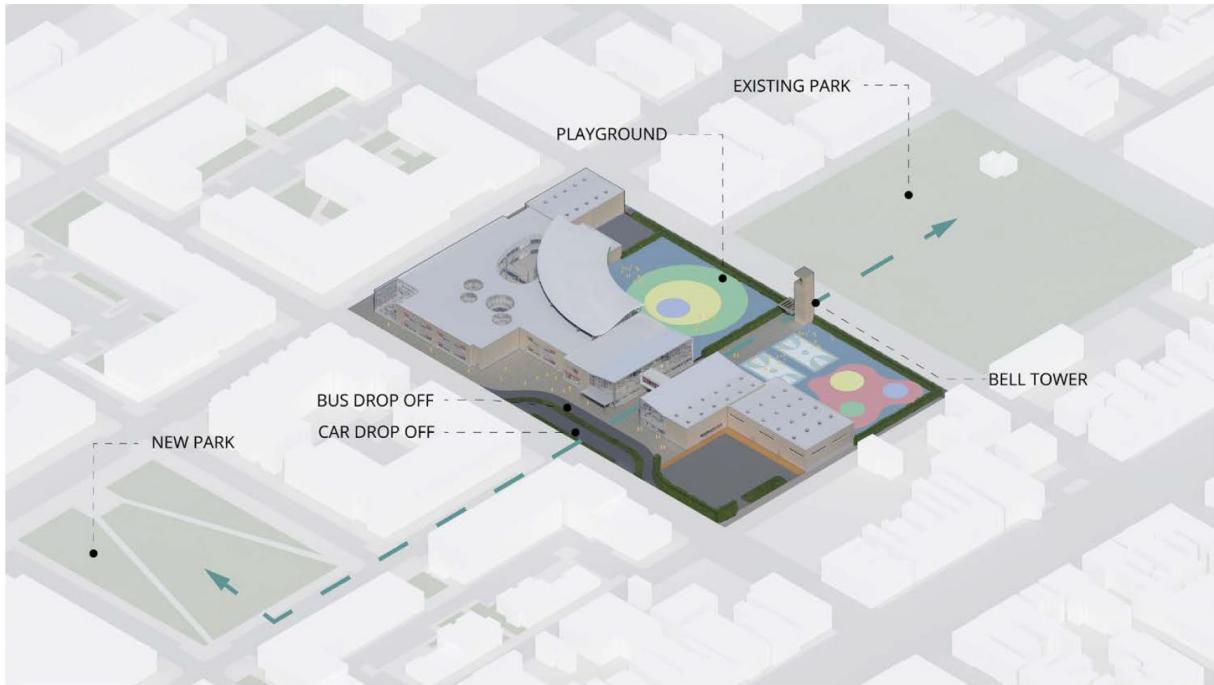
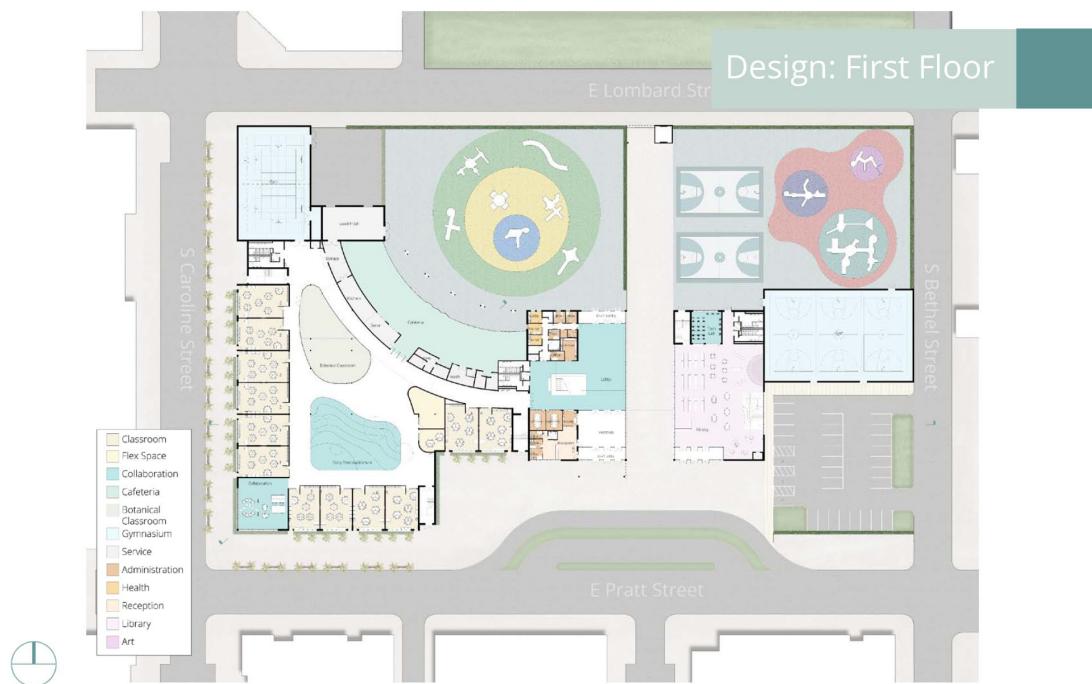


Figure 25: Axon of new design (Source: Author)

The first floor was designed with the intention of holding kindergarten, first, and second grade classes. There is access to a botanical classroom, as well as a story time auditorium space. This first floor also holds a curvilinear cafeteria as well as the main lobby space. This floor would also contain the admin and nursing suites as well as many of the service spaces necessary for the function of the school.



*Figure 26: First floor (Source: Author)*

The second story of the school would contain the third, fourth and fifth grade levels, as well as an indoor running track on the second story of the gym. There are also two skybridges: one across the botanical classroom as well as one connecting the school to the library spanning across the pedestrian promenade. This level also holds the art wing and other collaboration space. The main halls are punctured by circular light wells that go down to the first floor that pull

light from the outside and bring natural light into the interior spaces.



Figure 27: Second Floor (Source: Author)

The facades of the school utilizes brick and stone materials to match the surround existing context as well as the new construction to be developed. The glass wall also utilize colored stained glass to bring in a variety of playful colors into the interior spaces.

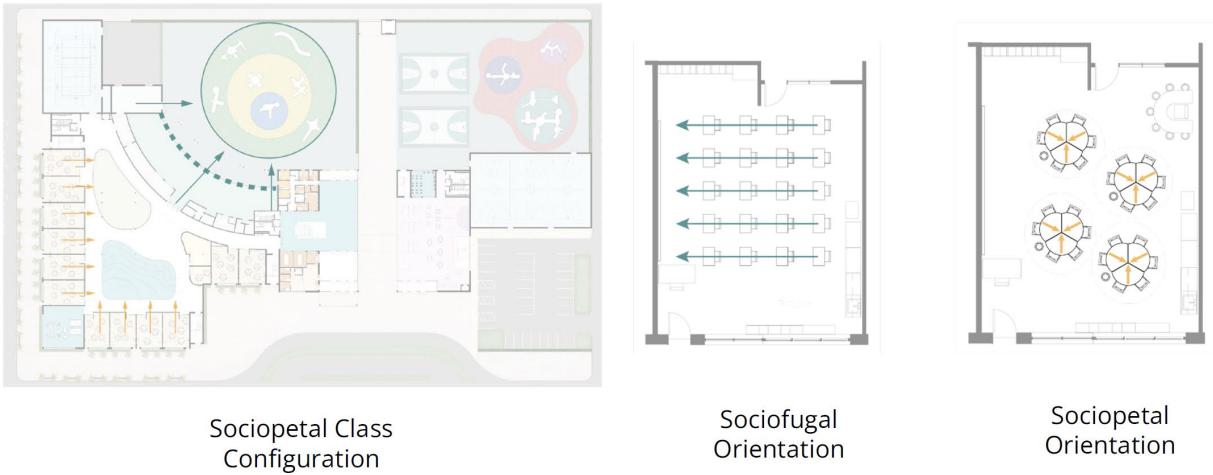


*Figure 28: Facades of building (Source: Author)*



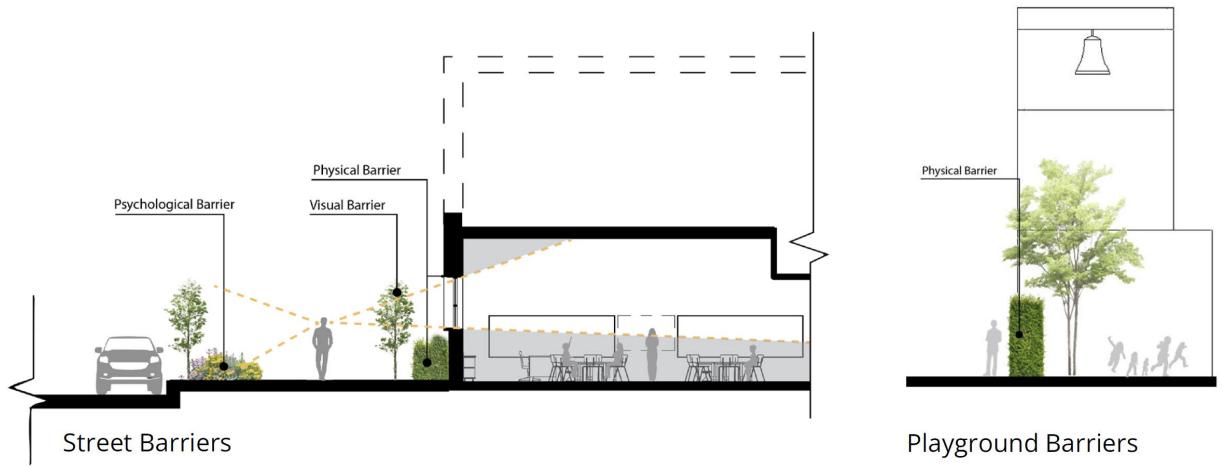
*Figure 29: Longitudinal Section (Source: Author)*

At three levels of design there are socio-petal or more collaborative design choices. The whole building facing inwardly towards playground or common spaces. The classrooms are configured in a socio-petal orientation by all facing inwardly towards the collaboration and shared spaces. The furniture is also configured in a socio-petal orientation to encourage interaction between students.



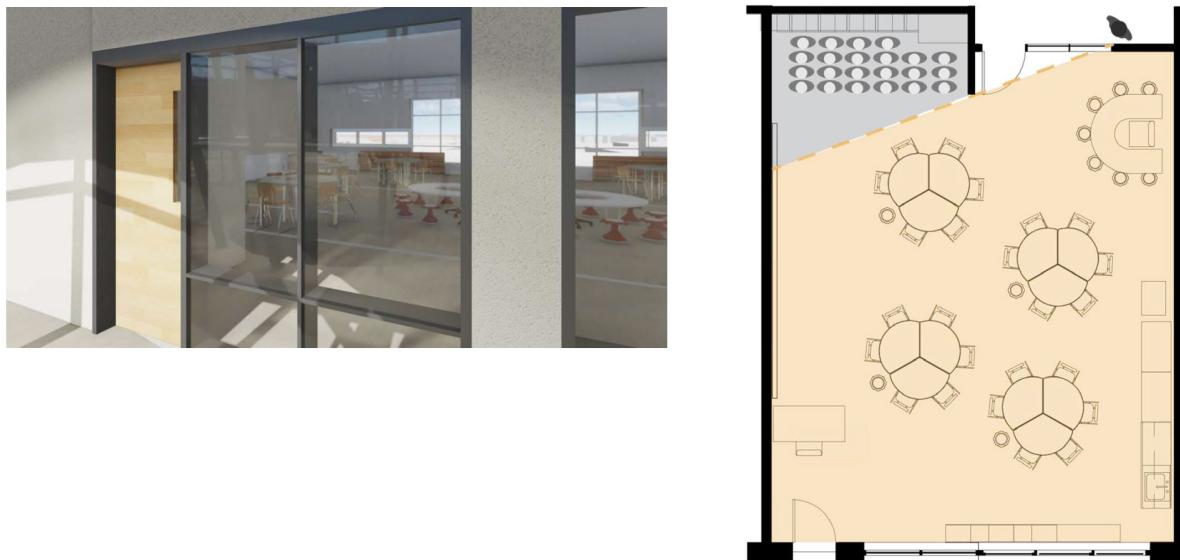
*Figure 30: Sociopetal Orientations of spaces, classes, and furniture (Source: Author)*

While this school is located in an urban context, there are still a variety of security measures taken to ensure safety and privacy. The windows of the first floor classes are raised so that people walking by cannot look into the classrooms and see the students, only the teacher of the classroom. There are also several layers of barriers of separation. Firstly, a physical barrier of a low hedge to create space between the walkway and window, as well as a visual filter barrier of trees, lastly a psychological barrier of bright flowers and vegetation on the opposite side of the sidewalk, to redirect the eyes back toward the street. The playground is also surrounded by eight-foot-tall hedges, which are much harder to pass through than chain link fences and access is controlled by gates.



*Figure 31: Natural Barriers (Source: Author)*

The next security measure incorporated in the event of an unwanted intruder are wingwalls in the classrooms. They are unassuming in design but create a blind spot in the classroom from the hallway, so that students can quickly hide in the event of an emergency.



*Figure 32: Wingwall security feature (Source: Author)*

The next security feature is the curvilinear main hall. This gentle bend of the hall limits the line of sight controlling what can be seen as an occupant moves through the space. This would avoid the straight narrow line of sight.

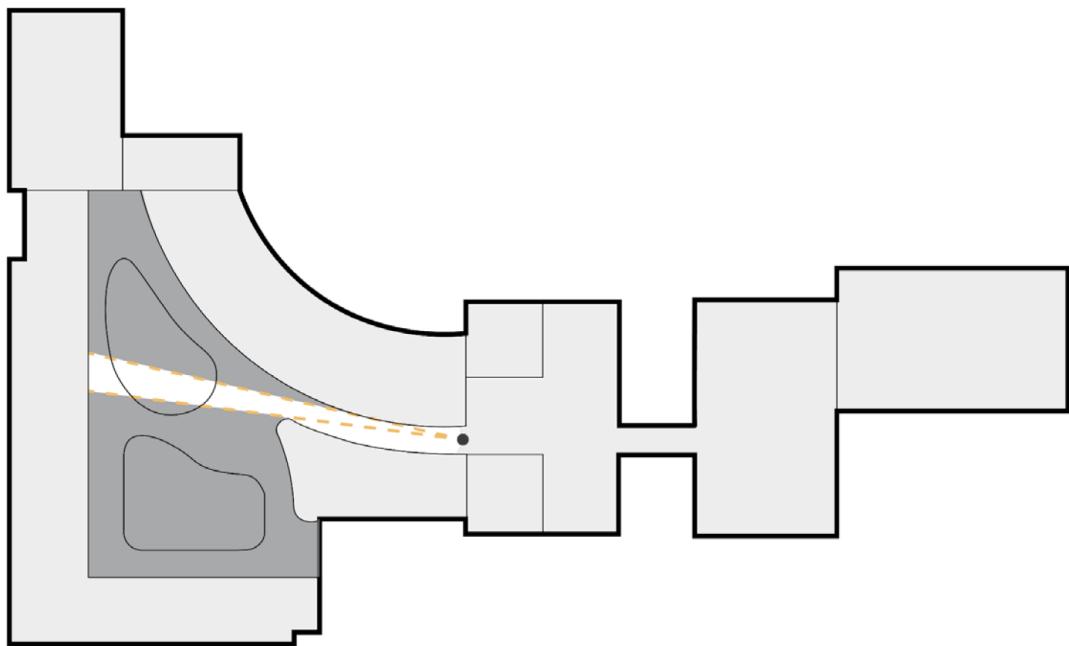


Figure 33: Curvilinear hallway (Source: Author)

Another security feature is the controlled entry of the school. While students are in class a visitor must enter a draft lobby and then be checked in by reception before entering a vestibule and then enter the lobby. Meanwhile, the security office is positioned to maintain a visual connection with the front door and vestibule space, with quick access to the reception and lobby if needed. The library reception desk is also positioned in front of the door so that outside visitors must be seen by reception as they enter.

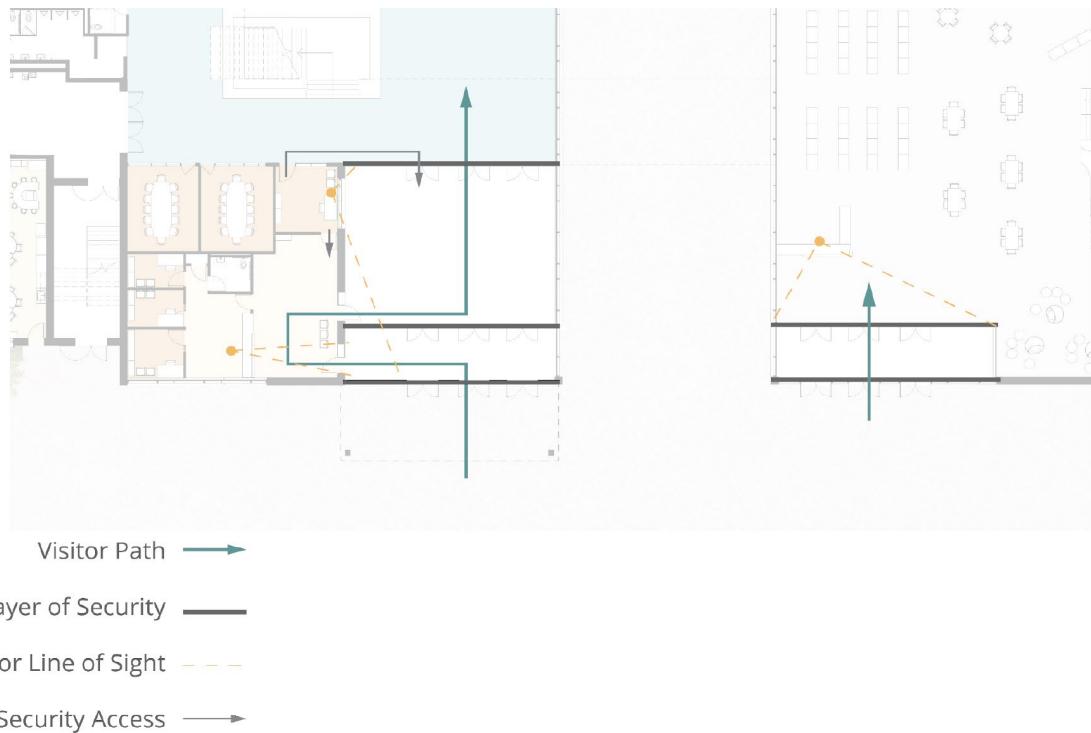


Figure 34: Visitor path of travel and monitor line of sight (Source: Author)

Another layer of security are the security roller shutters. These are placed at strategic points to block off access to the building in the event an intruder comes in from any point of the building. This would create a delay, allowing students to leave if necessary.



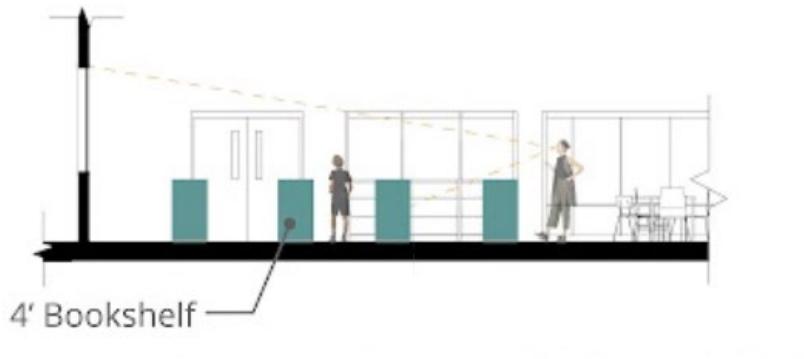
*Figure 35: Security roller shutters (Source: Author)*

While controlling the entry spaces is critical, it is also important to provide many exits. In the event of an emergency, the first-floor classrooms all have one-way doors that allow for a quick exit if needed.



*Figure 36: Safe Exits (Source: Author)*

Another notable security measure involves the utilization of low furniture, such as low bookshelves, within the library. This deliberate arrangement facilitates an uninterrupted visual connection between students and teachers.



*Figure 37: Low bookshelves (Source: Author)*

Lastly, these perspectives demonstrate that the integration of multiple security measures does not necessitate a compromise in the quality of spatial environments. On the contrary, the designed experience can solicit a sense of enjoyment among students while providing a space to

engage in all learning styles.



*Figure 38: Entrance (Source: Author)*



Figure 39: Lobby stairs (Source: Author)



Figure 40: Main hallway (Source: Author)



Figure 41: Typical Classroom (Source: Author)



Figure 42: Botanical Classroom (Source: Author)



Figure 43: Story time space: Source: Author)



Figure 44: Light wells (Source: Author)



Figure 45: Cafeteria (Source: Author)



Figure 46: Library (Source: Author)



Figure 47: Playground (Source: Author)



Figure 48: Section Perspective (Source: Author)

This study regarding the architectural aspects associated with school gun violence is vitally important to comprehensively addressing the issue. Although it may not offer a solution for all facets of the problem, it has the potential to take a significant stride forward in the endeavor to establish a secure, engaging, and community-oriented educational environment conducive to the well-being and enjoyment of students.

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