

Rock-Slide: Developing an Indoor Climbing Volume with a Linearly Actuating Hold
(Technical Paper)

Bidding for Better: Changing University Policy Regarding Hazing and Substance Abuse
(STS Paper)

A Thesis Prospectus
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By
Anthony Moore

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Technical Team Members:
Alexa Bourdon
Tristan Gross
Alexander Pommerenk
Ethan Whitt
Giles Steiner

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

ADVISORS

Gavin Garner, Department of Mechanical Engineering

Bryn E. Seabrook, Department of Engineering and Society

Prospectus

Introduction

In modern America, the demand for a bachelor's degree is higher than ever before. This increase in demand has primarily been driven the corporate world, where many jobs now require applicants to have completed college. As reported in the BBC, many managers have decided to demand college degrees for open positions - "in 2015, 67% of production supervisor job postings asked for a college degree, while only 16% of employed production supervisors had one" (Morgan, 2021). Understandably, these requirements have led to a dramatic increase in the number of students enrolling in colleges. In 2000, there were 100 million students enrolled in higher education institutions, representing a gross enrollment ratio of 19%. Less than a decade and a half later, enrollment had reached 207 million and 34% (UN). In the United States specifically, college enrollment has also skyrocketed in recent years, reaching 15.85 million undergraduate students in the fall of 2020 (Education Data). According to 2020 census data, 63.3% of American adults ages 25 and over had attended some college in their lifetimes (Census). The increase in university attendance has led to the college experience becoming a larger part of expected adolescent development.

In response to this change, universities and colleges have increased their focus on student life, prioritizing the social experience of college alongside the academic experience. As the California Agee, a college newspaper, reports "Getting a degree might be the reason that students go through the college application process and stay at their university of choice for another four years, but it's not the only thing that counts by the end of a student's college journey. One area of life that students particularly try to maintain in college is a social life" (Samplly, 2022).

Different students define this pursuit in different ways. One way that college students develop

this pursuit is through various recreational activities, including rock climbing. As Figure 1 demonstrates, rock climbing has boomed in popularity and new climbing gyms have allowed tremendous growth in the number of participants in the pursuit. Unfortunately, one of the limiting factors in climbing gyms has been the space and cost required to get a fulfilling climbing experience. A single climbing route, a path of holds that a climber attempts to follow from the bottom to the top of the wall, occupies between three and twelve feet of lateral space on a climbing wall. To create enough routes to keep climbers interested and challenged, a climbing center must be very large. The final technical deliverable for this project attempts to improve the space efficiency of climbing gyms. By creating a climbing hold that is able to dynamically adjust its position on the, a gym can program multiple routes in the same total area. The increased capability of this hold allows climbers to have enough interesting routes to provide a fulfilling and rewarding experience while saving valuable space in the gym. Additionally, the hold can be programmed to move during the climb, creating a gamified aspect of the sport that will provide an additional challenge for new or experienced climbers.

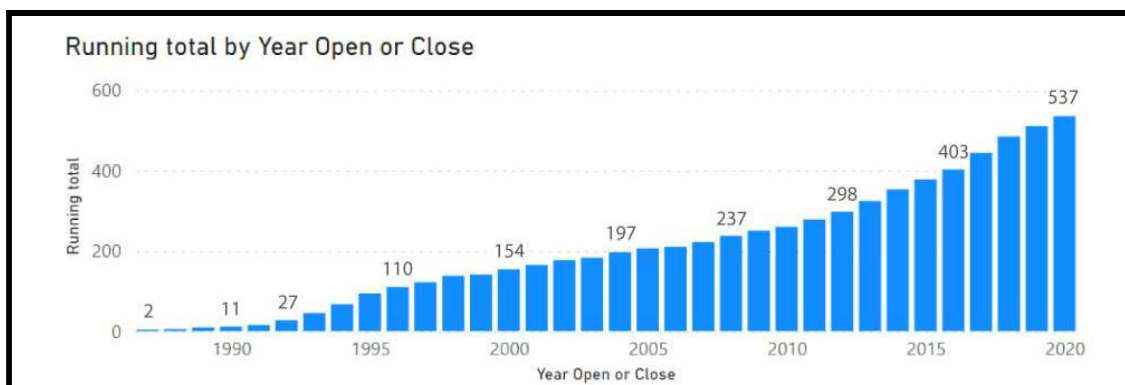


Figure 1: Total number of Climbing Gyms in the United States (CBJ, 2020)

Another way that college students pursue a rewarding social experience is through Greek life organizations. Fraternities and sororities have always been a part of college culture and as

college brings a larger focus to the social aspect of its experience, Greek life presence is under more focus than ever. This scrutiny has brought to light many of the problems in Greek life culture, specifically regarding hazing, substance abuse, and discrimination. The STS research paper, the other aspect of this thesis portfolio, will examine the validity of these problems, investigate how prevalent they are, and suggest changes that might attempt to reduce their negative impact.

Technical

As climbing interest has grown around the United States, many universities have installed indoor rock-climbing gyms as a way for students to participate in this activity in a safe, controlled environment. Most bouldering gyms follow a typical layout: the climbing wall is covered with holds, rigid plastic grips of various geometric shapes and volumes, larger, plywood geometries that protrude significantly from the wall and have holds mounted on them. Climbers attempt to reach the top of the wall by following given routes, a series of holds and volumes of the same color arranged in a specific pattern. A specific route is given a degree of difficulty based on how hard it is to reach the top without using holds of any other colors. Figure 2, seen below, shows Slaughter Recreational Center, the bouldering gym at the University of Virginia, and show a typical climbing gym combines holds, volumes, and routes to form a complete wall.



Figure 2: Labeled Climbing Wall (Slaughter)

The problem with this setup involves the difficulty level of climbs. For an enjoyable climbing experience, a climber should be climbing routes that are close to their ability level, too difficult and it becomes frustrating, too easy and it becomes boring. To appeal to the drastically different levels of climbers, a gym must create routes across all climbing levels. Unfortunately, the need to appeal to all climbers leads to a lot of wasted space. For example, if a gym has thirty different routes across all difficulty levels, a given climber would likely only be interested in the five or six that are appropriate for their skill level. The skill-level difference of each of its climbers leaves climbing gyms with an obvious problem, in order to provide interesting climbing experiences to all levels of climbers, the gym must create five or six times more routes than any given climber will typically use, leading to gyms wasting time and space. Additionally, some climbers may still be excluded if the routes are not of an appropriate difficulty level.

To address this problem, our technical team developed a moving climbing hold. Rather than attaching a hold to a fixed point on the wall, the hold is attached to a moveable platform. Behind the wall, this platform is attached to a lead screw which will allow it to move across the wall as programmed. The idea is that, instead of creating routes tailored to only a few skill levels, these holds would allow for multiple climbers to experience stimulating climbs on the same

route. Before approaching the wall, a climber would enter their approximate skill level and the holds in the route would be able to adjust their position to provide an appropriate difficulty level. This innovation would drastically reduce the amount of space required for a climbing gym and would increase the number of climbers that can participate in the activity. Ideally, under certain conditions, the holds would also be able to move during the climb, providing an additional degree of interest and entertainment for users. The final deliverable will be a single prototype of this type of hold, shown below in Figure 3, which could be integrated into a traditional climbing gym or expanded upon to create an entire wall of adjustable holds.

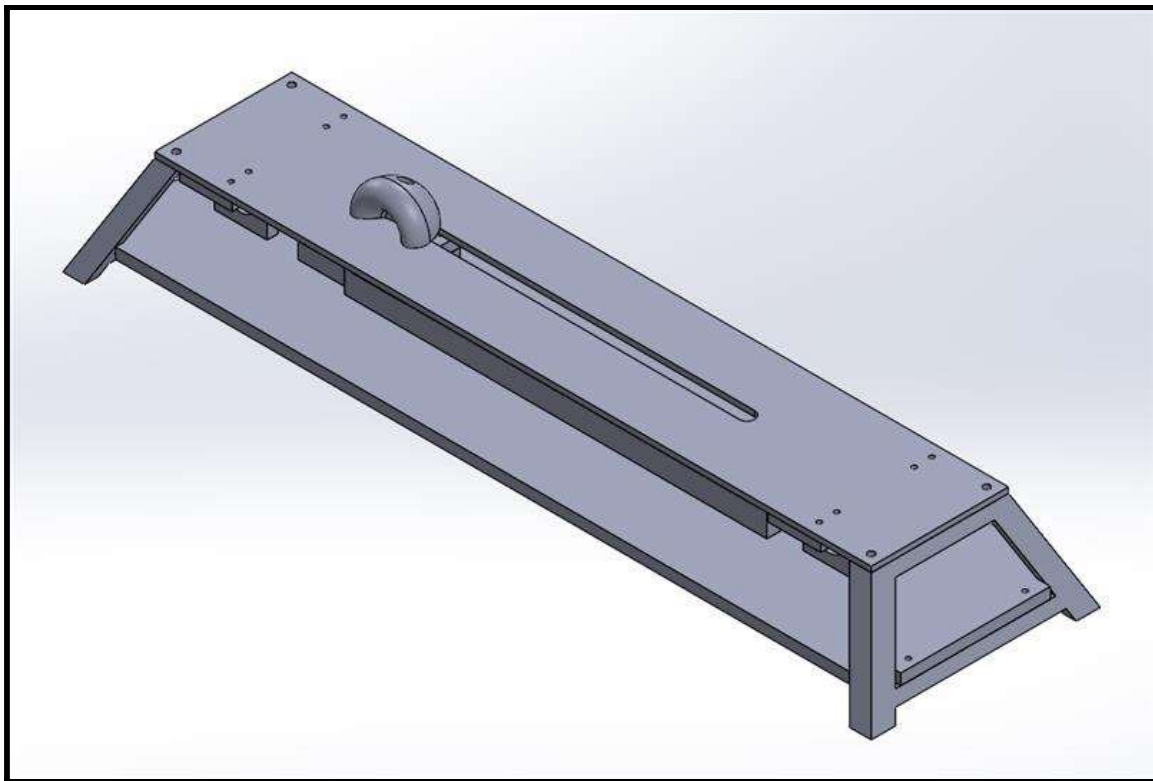


Figure 3: 3D Model of the Final Deliverable (Moore, 2022)

STS Topic

As spending four years at college has become a more ingrained part of the young adult experience, Greek life organizations have grown in America. In 2021, New Mexico University

reported there are over nine million fraternity/sorority members or alumni nationwide (University of New Mexico, n.d.). Greek life holds many promises for students such as lifelong friendships, networking opportunities, and exciting social events. However, as its prevalence on college campuses has grown, so has the scrutiny. Hazing, a practice in which older members force new pledges to complete certain tasks to prove their devotion, has resulted in serious injury and even death. According to Hank Nuwer, a Ball State University professor, at least 104 students have died as a direct result of college hazing between the years of 2000 and 2022. He also reports that 1958 was the last year where zero fraternity deaths were reported in North American schools (Nuwer, 2022). This report demonstrates the shocking number of hazing deaths that are accepted as an inevitable part of fraternity culture.

Substance abuse has also become a predominant issue in fraternity and sorority culture. Many Greek life events center around alcohol and parties, which can easily lead to unsafe drinking behavior. According to two university studies on the research, Greek life affiliated students were reported as “engaging in higher levels of drinking and unsafe sexual practices” (Eberhardt, Rice, & Smith, 2003; Tampke, 1990; Wechsler, Kuh, & Davenport, 1996). In a paper published by students at William and Mary College, it was reported that “the odds of affiliated, first-year students binge drinking one or more times in a typical two-week period were 1.8 times greater than for their unaffiliated peers. For fraternity/sorority seniors, the odds of binge drinking one or more times in a typical two-week period increased to 2.4 times greater than those of unaffiliated seniors” (Asel, 2015). These habits have a direct link to academic performance and overall student success. In the Core Alcohol and Drug Survey (CORE), over 20% of students reported performing poorly and nearly 30% reported missing classes due to alcohol and drug use. Additionally, “findings from the CORE survey indicate students with a GPA of A drank an

average of 3.3 alcoholic drinks per week, whereas students with a B drank 4.8 drinks, students with a C drank 6.1 drinks, and students with a D or F drank 9.0 drinks” (Presley et al.). This indicates a clear correlation between heavy drinking and academic success, showing preliminary evidence that

Despite these factors, Greek life remains as involved with college as it ever has been. An analysis of the relationships between universities and their Greek life organizations are required in order to better understand what causes these problems and how they can effectively be addressed.

Frameworks

In my STS Research Paper, I will investigate what factors influence Greek life organizations and what students and universities can do to positively influence their effect on student life. In order to conduct this investigation, I will primarily rely on Actor Network Theory, an STS framework that easily allows for investigation of large and complex organizations. To conduct an Actor Network Theory investigation, a central organization (or “actor”) is identified, in this case, Greek life organizations. Once the primary actor has been identified, a network is constructed by identifying other entities or organizations that influence that original actor. This process is continued with both the central actor and the connected entities until a sufficiently extensive web is formed. Once completed, the Actor Network Theory analysis will provide a detailed map of what has influence over Greek life organizations. A fundamental flaw with Actor Network Theory is that the framework fails to provide explanations or solutions to the initial problem (Seabrook, 2022). Consequently, I will pair this with a direct investigation into some of the problems found in modern fraternities and sororities. Ideally, this

investigation will identify the primary issues and the Actor Network Theory analysis will be able to help identify potential causes and solutions.

Methodologies

The bulk of the conducted research will fall into two categories. The first category of research is to identify the problems associated with fraternity and sorority life. In the preliminary phase of this research, I was able to identify two potential problems – hazing and substance abuse. I will continue to investigate these problems and determine how much they effect student outcomes. Additionally, if any other issues come to my attention during this research process, I will investigate them as well.

The second primary category of research will focus on the Actor Network Theory analysis. It is important to research which organizations are associated with Greek life organizations. One primary way to identify these connections will be to investigate the funding/donations to and from Greek life organizations. This will allow me to target my research on the sources that are most connected to fraternities and sororities. Once the organizations in the network are identified, I will focus my research on the connections between fraternities/sororities and the primary organizations in the network. The focus of this investigation will be on the nature of the connection (money, reputation, etc.) and the strength of the connection (how important is one actor to the other?).

Once this research is completed, I will build on this research to determine the ways in which these stakeholders can be motivated to change these organizations to produce better student experiences.

Conclusion

This paper outlines an investigation of student life and seeks to provide better outcomes for student success. In a technical aspect, the team attempts to provide a solution to a common problem faced by rock climbing gyms and organizations, especially those on college campuses. Hopefully, this solution will provide a framework by which this healthy and fulfilling activity can be brought to more universities and can be accessible to more students.

To address another aspect of student life in college, this paper will explore the relationships of Greek life organizations to college students and university leadership. As previously stated, fraternities and sororities are an integral part of many people's college experiences. This paper will investigate some of the failings of these organizations and strive to provide actionable solutions that college leadership and students can take in order to improve their relationships with these groups.

College has become an important part of the young-adult experience in America. This has many positive and negative effects on its graduates. Through two distinct yet related methodologies, this project attempts to improve the college experience for current and future students.

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