Assessing Living Arrangements in Residential Halls

Senior Design Project Report

June 3rd, 2010

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Assessing Living Arrangements in Residential Halls

At Cal Poly San Luis Obispo

By Romel Peñaflor Auza

Hundreds of thousands of high school graduates head off to college each fall not knowing the environment they'll be living in for the next four years. The factors that predict success in the academic, social, and personal aspect of these freshmen students' lives revolves around one aspect that is often times overlooked. Freshmen students are subjected to the fast paced lifestyle of college and often times they need to feel “at home”. Their personal space becomes a matter that is important to them in relation to their success in the three aspects of academic success, social integration, and personal health. However, with universities statewide and nationwide being overcrowded with incoming freshmen students in the recent years the aspect of personal space that many college freshmen need is being suppressed and overwhelmed. This project proposes to study the effects of residents living in an overcrowded Living Learning Program hall room. This study aims to examine how residents in a triple living arrangement differ from residents in a double living arrangement. The project also hopes to bring to light the importance of adequate and sufficient space for residents in their college dorm rooms and aims to improving them through facility design.
I. INTRODUCTION TO THE STUDY

California’s Polytechnic State University San Luis Obispo's campus' student population has grown significantly in the past decade. Priding itself as the premier California State University for engineering, agriculture, and business, Cal Poly San Luis Obispo has attracted quite a lot of attention over the past decade. Cal Poly San Luis Obispo has distinguished itself as a school that promotes the philosophy of “learn by doing” in which students gain insight and knowledge through firsthand experiences, whether it is through project based work or internships and co-ops with companies.

However, with the rapid growth of applications to get into Cal Poly, the problem that the University faces is not only the overwhelming numbers of students to match with faculty, but also that the University's housing plan for these incoming freshmen and continuing sophomores and juniors is becoming more and more strained. The resource that the University Housing commits itself to is providing living quarters for almost every freshman possible; with of course the exception for the few who don't get to live in the dorms due to personal choice or late housing registration priority.

There are six main halls for student freshmen designated as the Living Learning Program (LLP) halls. These residential halls of Santa Lucia/North Mountain, Trinity, Muir, Sequoia, Fremont, and Tenaya are freshmen oriented dormitories that offer to each resident a living space that is to be well accommodated for the average incoming college freshmen student.

All on-campus housing has a working advisor staff that caters to the freshmen's needs and concerns. These Residential Advisors, otherwise known as RAs, work closely with the residents on matters pertaining to everything college related, whether it’s about classes, roommate conflicts, or other personal/social issues. And in working with the residents, it has come to their immediate attention that a common problem among residents is the cramped space they encounter in their dorm rooms. Santa Lucia, as well as the other five LLPs, has triple living arrangements on all three of its floors. The room is
packed with two bunk beds, a third extra closet, and another desk. When looking into these rooms packed with two bunk beds, a third extra closet, and another desk, residents appear confined to tight living spaces. The third resident who gets the “extra” drop leaf work desk is pressed up closely against the wall and window. On several accounts there have been instances where a residential advisor's residents have asked if they could be moved to another hall or room.

The job of any residential advisor hands them the personal and emotional responsibility to ensure that residences can live comfortably in their rooms and more importantly in their Living Learning Program halls. However, with the current situation poised to advising staff by University Housing it has them investigating not only their resident's safety and health, but their academic well being as well. A resident's first year in college is vital to their success as a student. Their first year will have them exposed to different environments that will create an everlasting impression on how they'll handle school, personal, and social issues in the future. Gaining an understanding on exactly how the resident's prioritize their time can further open up questions on whether or not their living conditions in their dormitory rooms affect their study habits, sleeping habits, and personal and social habits.

The intended purpose of this project is to meet the following objectives:

− A study that will measure the levels of satisfaction of freshmen residents living in triples compared to freshmen residents living in doubles by acquiring data of all the residents that move out of triples and into doubles or on-campus apartments elsewhere

− A complete redesign of the current layout using possible alternatives that will maximize the amount of space to be utilized in the room

− An ergonomic checklist that will validate the best choice for possible alternative in room layout.

In order to remedy the problem with overcrowding in residential halls at Cal Poly San Luis Obispo, a complete redesign of the room needed to be done. It was necessary that plans were arranged so that studies could be conducted to test the validity of every possible room layout alternative. This issue was
addressed using a comparative study between two person living arrangements and three person living arrangements. Further inquiring by the study also gauged freshmen residents' perception of living and studying satisfaction in the residential halls. Something as simple as a survey or questionnaire handed out to residents helped obtain vital user feedback needed to make the improvements based strictly on student demand, without the influence of the opinions from University Housing. Feedback at a “grassroots” level proved to be useful in understanding what needed to be done to make residential living more manageable and conducive to freshmen resident's needs.

An important aspect that would address residents' needs would be a human factors or ergonomics approach. Working within the confines of the residential dorm rooms in the Living Learning Program Halls (LLP) the project provided insight into the differences in levels of satisfaction between two people versus three person living arrangements. The analysis on resident satisfaction was conducted through personal interviews and surveys that gave in-depth details about what factors resulting from overcrowding were the main proponents in residents moving out of triples. The alternative room layouts themselves exist; however, the way in which each layout was validated was through another planned deliverable: an ergonomic checklist. This checklist gave the project an evaluation process that looked through each aspect of the room from seating arrangement to amount of space between each bunk bed, wall, and desk. All the possibilities in redesigned residential room layouts for the LLP halls were based solely on the study, and would be implemented by the University Housing given the proper justification brought about by research/observation and the cost of the overhaul before and after.

This project focuses primarily on redesigning the current three-person living arrangement without needing to completely change or retrofit the existing infrastructure of the residential halls. Any offered alternatives and changes will make use of the current facility “as is”. The project also studies and provides a means to measure the residents’ level of satisfaction for their current living conditions in the dorm and whether the resident is living in a triple or a double. This level of satisfaction for the residents
is drawn from their ability to work, study, socialize, and sleep properly in an already space-constrained environment they’re not quite used to and examined through the use of the surveys and the application of the ergonomic checklist to all the possible room layouts. The feedback from freshmen residents provided useful information on how to improve the conditions in the triple living arrangements and allowed for the identification of problematic areas that needed immediate attention.

The development and use of the ergonomic evaluation checklist weighs each layout in order to determine the best choice for residents and provides freshmen residents with the most usable space available. Each layout (double, triple, and three alternatives of the triple) was evaluated using the ergonomic checklist and resident feedback. Necessary items to place on the ergonomic checklist were discovered through the use of other checklists and resident feedback. The compilation of the University Housing’s ergonomic evaluation for the six Living Learning Program Halls was heavily influenced by workstation and workspace ergonomic checklists provided through the National Institute for Occupational Safety and Health (NIOSH) which had readily available sources online. These were compared and adjusted to fit and apply to University Housing’s freshmen dormitories in the LLPs.

The development of the alternatives layouts was completed through the use of resident feedback and facilities principles based on human factors. For example, areas that could not sustain human movement were deemed “utilized” space. Problematic areas like the drop leaf desk used by the third roommate or the narrow spaces between stationary closets and bunk beds were taken into consideration when moving around the room furniture. Available free space was calculated in each of the default layouts (double vs. triple) as well as in the alternative layouts for the triple living arrangements. Having compiled the ergonomic checklist based on what freshmen residents would like to see improved in their rooms each of the five layouts (double, default triple, and three alternative triples) were evaluated to see which layout obtained the highest ranking. The higher the layout was ranked, the better it was at addressing and solving the problematic areas.
This project does not focus on external factors that may or may not adversely affect their living satisfaction such as students’ involvement in extra curricular activities (i.e. sports, band, organizations, or clubs). The project scope focuses primarily on the Living Learning Program Halls since the six halls of LLP are the residential halls with the most noticeable overcrowding. These halls are Sequoia Hall (College of Architecture), Muir Hall (College of Mathematics and Science), Fremont Hall (College of Agriculture), Tenaya Hall (College of Business), Trinity Hall (College of Liberal Arts), and Santa Lucia Hall (College of Engineering).

There is a lot to be gained from this study because residential life plays such a fundamental role in the academic mission set by Cal Poly San Luis Obispo. The profession of being a student has changed over the past few decades. With increasing numbers of young adults attending college and freshmen living in the university residence halls it is imperative to look into how students utilize their given environments. This project is able to provide insight into how to optimize the overall satisfaction of those individuals living in the residential halls.
II. Background

The number of freshmen students applying for Cal Poly San Luis Obispo has been steadily increasing over the past decade. In looking at available data online through Cal Poly's Statistical Fact Book the number of freshmen applying for Cal Poly in fall of 2003 compared to fall 2007 is a difference of 10,000 students. Cal Poly's selection rate for fall 2003 was 38.4% whereas in the fall of 2007 the selection rate had increased to nearly 45% with 30,176 applicants and only 13,520 being accepted. With the increasing strain on the state's budget spending, Cal Poly has still been able to bolster its university with students from all over the nation wanting to get quality education for a sensible price. However, this image of quality education “for less,” so to speak, has come at an ultimate price in terms of living standards for some of the incoming freshmen. A few thousand of these freshmen live in crowded spaces while a majority don't even get into University Housing and are then left to find housing off campus. Students living on campus in the residence halls are encouraged to follow the University's academic mantra of studying 25 to 35 hours per week, calculating out to a rate of 2 hours per unit. This however can be a bit difficult for some students to commit to due to several factors ranging from inability to cope with a new living environment to having to deal with the collegiate level of education.

As a result some students find it hard to adjust to their first year here at Cal Poly and some more than others cannot keep up with their academics. There is the external factor of the students being “away from home” for the first time and with that a sense of personal “freedom” it can be both an advantage and a disadvantage to their first year. However, the idea of home for most students is somewhere they can retreat to, feel at ease, and get their work done. Cal Poly San Luis Obispo's University Housing states that their overall aim for incoming freshmen residing in the Living Learning Program halls is to “provide an environment where students can be fully integrated into campus life so that they experience a full sense of connection to their majors and are personally and academically enriched by their surroundings”. However, with the visible overcrowding of these residence halls here
on campus, specifically the Living Learning Program Halls of Trinity, Santa Lucia, Muir, Sequoia, and Fremont, students may have a hard time finding that appropriate adjustment. And while the Living Learning Program staff and University Housing encourage students to utilize their in-hall resources such as the study lounges and common rooms, it is these same areas that often times aggravate, discourage, and distract students from getting their work done.

Common areas and study lounges are located on the first floor of the buildings which means the students are exposed to a high amount of resident and Living Learning Program staff traffic moving in and out of the hall. This distraction is all too common and to the bane of most residents the work they hope to get accomplished is often met with a distracting and noisy environment. As evident in any Living Learning Program hall, students are often “forced” inadvertently by these conditions to go and study elsewhere. Students come back late at night after making trips down to the University Union, Library, or labs just to get their work done. The time students spend walking back and forth from these locations takes a definite toll on their ability to stay focused on their course work and can contribute to several underlying factors that may or may not affect their collegiate careers.

Students that do choose to stay in their rooms to study and do work are faced with varying factors pertaining to their living arrangements. Every room in the Living Learning Program halls is approximately 13 feet by 11 feet by 9 feet. The room arrangements in the LLPs are either a double living arrangement in which two residents reside or triple living arrangement where three residents live. Students living in doubles have an appropriate amount of space to move around in and have two tables with drawers and ample desk space. Doubles are also furnished with a twin size bed for each resident, two chairs, and two large wardrobes. Triples on the other hand are furnished with two bunk beds positioned up against the right and left side of the walls, an additional wardrobe, three chairs, and an additional desk; all utilized within the same limitations of the 13 feet by 11 feet by 9 feet constraint. Two of the three residents are subject to sleeping in the top bunks while the third roommate sleeps on the
bottom half of one of the bunk beds. The other bottom bunk bed half is converted into a table in which two of the three roommates share for personal workspace. The third resident gets his/her own desk in a tightly compacted corner of the room nearest the window. Taking into consideration that students living in both double and triple units want to bring all the necessary amenities such as refrigerator units, televisions, their own personal computers, and other personal belongings such as clothes hampers and storage bins, the room gets considerably overcrowded. The living arrangement, especially for triples, is a highly volatile environment because residents will tend to have conflicts with their roommates over issues of personal space, seating, and sleeping arrangements.

Ultimately these issues will play an impending role in how the student will live, work, and study their entire freshmen year. And while the overall gain of students living in these Living Learning Program hall dormitories is to essentially expose freshmen to the whole college “experience”, the main agenda of any student is to succeed in their studies, retain what they've learned, and ultimately graduate on time. The living conditions can be seen in a positive light in that it promotes students to make use of their time, adjust to new environments; however, these same conditions restrain the aspects of what the University aspires to bring to the students: a comfortable and safe room.
III. REVIEW OF THE LITERATURE

The literature review for this project focuses on students living in an environment that is socially and academically accepting. Another aspect this review focuses on alternatives that can be viable economic choices for Cal Poly's University Housing to remedy the effects caused by the overcrowding of residence halls. Compiled in this report are resources drawn from eighteen sources: three engineering textbooks on topics of human factors engineering, engineering statistics, and facilities planning; two textbooks on the educational potential of residence halls on freshmen college students; and thirteen journal articles that contain studies and reviews on the growing relation between academic retention and psychological effects of resident environments.

California Polytechnic State University San Luis Obispo's University Housing is an organization within the university that has its capital investments in its facilities that are the several different residence halls and on-campus style apartments where a few thousand residents live, study, and work. It is without a doubt that the single most important cause of high costs in any organization is the lack of proper strategic facilities planning that focuses on effective handling of housing operations. Long term effects of choices made by University Housing are also studied in core areas such as resident satisfaction in triple living arrangements, reduced costs for living arrangements, upgradability, adaptability, reliability, maintenance, and economic progressiveness (Bozer, Tanchoco, Tompkins, and White, 2003). University Housing is at a loss if they must continuously move students out of halls that are too crowded and into living arrangements that are reasonable. Also, University Housing can face legal action regarding the risks involved with on-campus living arrangements.

Resident “triples” in particular have a myriad of problems ranging from poor lighting conditions to constraints with space in the room. The proper manner in which University Housing can improve these conditions can be studied from the Facilities Planning resource. Topics such as making a room appear more spacious within the confines of its dimension are something that can be achieved through
trials of different room layouts. Adaptability of the room can be studied and efforts to create an environment that is both beneficial to the resident and to the longevity of the room itself can be properly justified through the entire project's costs. Another key point to focus on in facilities planning is the safety and environmental concerns. The source properly labels and addresses certain building codes, fire codes, and structural certifications to make sure University Housing is in accordance with state and federal law. By fully utilizing the strategic planning involved with facilities design, it is imperative to create a “triple” that is both economic and adaptable for the modern day college student (Bozer, Tanchoco, Tompkins, and White, 2003).

In conjunction with the facilities aspect of this review, there are three key principles of ergonomics that should be considered with every work related and non-work related environment (Ostrom, 1993). An environment such as a dormitory room can be considered both a workplace and a social realm that promotes interaction among residents. Students do their homework, projects, and spend countless hours in their chairs or beds on their computers, reading books, or simply socializing. With space being an immediate issue for three residents in a bedroom originally designed for two, it is imperative that all three residents' room is befitting for the tasks they have to do (sleep, study, eat, etc), is substantial enough for residents that vary in ranges of body sizes, and is sustaining for residents who are to live in the room in the future. With that said, it is assumed that the range of sizes a design for a room usually needs to cover 90 percent of the population to be served, thus ensuring that any individual can live comfortably without any problems (Ostrom, 1993).

Surveys and questionnaires will be one aspect of getting resident feedback on satisfaction towards their living conditions and their well being in relation to academics, social, and personal life. A major aspect of concern for surveys and questionnaires in particular is their overall validity in relation to this project's intentions. These of course will have to be conducted in an environment that is free from bias, and will often be completed in complete confidentiality. A problem found in many surveys and
questionnaires is the possibility that residents would not fill them out if they are made voluntary (Gordon, Sallie, Lee, Liu, and Wickens, 2004). Another aspect that would contribute to survey bias would be that of student residents living in triple units versus students living in double units. Hence, the different levels of satisfaction in relation to living conditions and student performance will be slightly misrepresented. According to a study done by Willard Rodgers, there is no statistical method to verify satisfaction in any social setting (Rodgers, 1981) Nevertheless, when gauging satisfaction levels by residents it is important to look into objective versus subjective measurement issues revolving around residents living in the dormitories. For example, in considering subjective measures in surveys and questionnaires the feedback from some residents when making “preferences” in how triple room units should be handled may not always support the most beneficial requirements across all spectrums of dormitory life. It should be noted as well that when a statistically significant correlation is found between dormitory living conditions for triples and that of the residents' academic performance and personal well-being it cannot be assumed that one of the variables caused the changes in the other. A resident's poor academic performance may be the direct result of bad study habits obtained in prior educational institutions or perhaps other factors outside the scope of this project such as family issues back home (Aitken, 1982).

Education outside the classroom may be the most potent form of education for most residents on any university campus. While learning for the most part is done in classrooms, students take what they've learned and reapply it when they're in their own environment. Essentially, the principle driving force for the teaching of students is the students themselves. If the environment that they're in does not promote that motivation in any manner than the ranges of success for these student residents will differ accordingly (Schroeder and Mable, 1994). Students living on campus are exposed to an environment where residential living creates both a social and psychological environment that has the potential to maximize their development as freshmen students. The sudden change from a low density
population to high density population for freshmen students may contribute to social and cognitive overload (McCarthy and Saegert, 1978). The time spent in an environment that has three residents living in one room together will more than likely increase the chances of students feeling overwhelmed. There is also evidence stating that students living in residential halls have higher levels of involvement due to the relatively close proximity of students in a building (Inkelas, Johnson, Longerbeam, Owen, and Vogt, 2006). In the case of students living in triples, their development may differ in that there are two categories for triple living arrangements. There are the triple living units where all the residents residing in the room have previously known each other either from high school or summer school. Also, there are the students residing in a triple unit where they have no prior knowledge on each others' backgrounds. With that said, it is easy to mistakenly conclude that different categories of triple living arrangements are causing different student outcomes. However, different residential living arrangements may simply reflect the attitudes of the residents who prefer roommates they know and residents who don't mind having to share a room with two other complete “strangers” (Schroeder and Mable, 1994).

It is important to note freshmen retention is not a goal that can be obtained simply through pressuring student residents to “put up” with their living conditions. It is vital to note that in order to keep these residents in the dormitories significantly satisfied University Housing must attempt to extend quality not just into their educational programming, but also implement a quality standard into their living standards as well (Upcraft and Gardner, 1989). It is important that University Housing is receptive of student residents' needs and that these needs are properly and fairly addressed, managed, and improved. More importantly, quality can be reflected through the perspective of the student resident when they first move into on-campus dormitory life. The first impact that a collegiate environment may have on a freshman is a transition from their previous environment to that of a collegiate environment. Residents are prone to getting homesick and experiencing high amounts of stress if they're not used to
living with two other residents in a space constrained environment of a triple living unit. This distinct transition for most residents can prove difficult since some are not used to the college climate and environment. As a result the resident may or may not be negatively affected. It can be assessed through further study that the degree to which a resident fits in with their living situation can affect resident satisfaction with conditions that they're placed under, academic success, and personal growth (Upcraft and Gardner, 1989). However, if accommodations are made to the room and all three residents can live comfortably and safely then there is potential for growth and development.

Living satisfaction can be seen as a component in the residence halls because the relationships that develop between residents are highly significant. Residents in a triple living arrangement are exposed to smaller groups of students their age with whom they can associate with for school, work, or recreation. Peer relationships involving roommate behavior and conduct are also relevant in that residents will be living together for a whole academic school year and therefore are somewhat coerced into making the best of their living arrangements. The quality and condition of the student residents' rooms, halls, and restroom facilities all are significant determinants of residential living satisfaction. It was found that by improving aspects of the residential halls and rooms such as dorm room physical condition, study facilities, and dorm security there would be a positive impact on student satisfaction (Aitken, 1982).

Academic success can be fostered and developed in residential living arrangements. According to Thomas Ware and Michael Miller on campus housing plays a significant role in a first year's academic performance and retention (Ware and Miller, 2009). The role of on-campus housing contains several key aspects that promote a better social and psychological climate between students and among their roommates. University Housing's role relates to how a resident feels about their quality of living on campus, how important the residents themselves view studying, and how they perceive working hard to achieve good grades. Residents are therefore exposed to several factors in the halls that can influence
their perception of education. It is important to note that because freshmen students spend more time performing “personally important activities” in their dorm rooms than in the classroom, their rooms become a significant environment where effects of overcrowding mixed with limitations in space can contribute to residents feeling trapped and unmotivated (Stokols, Ohlig, and Resnick, 1978). On campus housing and housing facilities in general can help add credibility and desirability for student residents to succeed at their studies, or on the other hand may discourage the academic and social capabilities of student residents (Ware and Miller 2009).

Dolapo Amole (2009) investigated the relationship between residential satisfaction and levels of residential environment in a university college environment, specifically the on-campus dormitories. The study found that there were three factors of environment that played a significant role in student resident satisfaction. These three factors were the bedroom itself, the floor the students were put on, and the hall connecting their rooms to the rest of the dormitory. It was found that the satisfaction for these residents were similar across each level. It was found that the dorm room itself appeared to be the most important environment for residents since the bedroom is where they reside and conduct business within their own realm and territory. The study found that students that were dissatisfied with their bed rooms were generally dissatisfied with the environment itself, suggesting that the social, physical, and/or design dimensions play an overwhelming role in resident satisfaction. The study showed that students residing in residence halls will generally respond to the different levels of environment and that their general responses with respect to satisfaction with living conditions are the same (Amole, 2009).

In a study conducted at New England University by Hendersholt, Wright, and Henderson (1992) the quality of life at the university's residential hall was measured through a general survey that was passed out randomly to 200 student residents. The study found that the students were generally dissatisfied with their living conditions in the dormitories than with their academic or social lives. The
researchers concluded that the general level of dissatisfaction among student residents with their living arrangements was due in part to space constraints, a high lack of privacy, freedom, and generally poor maintenance of the residence hall facilities (Ware and Miller, 2009).

Myers and Baer (1996) have examined the special characteristics of overcrowding. As an issue in housing policy in general, overcrowding and its immediate effects are detrimental to the residents' physical and mental health. In a college environment it is likely that residents will experience overcrowding; however, despite the phenomena of overcrowding not being explained it can be inferred that there are harmful effects should it occur (Baer and Myers, 1996). The study concluded that while there may not be enough scientific studies or citations to support this claim, organizations such as the American Public Health Association or building code officials have pretended that the standards they set for facilities have “some basis in science” (Baer and Myers, 1996).

The goal of a majority of students in college is to pursue academics in a manner that drives them closer to their end goals. In a study about motivation under social temptation, Groenewoud and Schouwenburg (2000) examine university students' general motivation towards studying as a measure of resistance to social situations. The college atmosphere promotes social motives; however, this implies that students must consistently make choices between studying and partaking in social activities. The study found that the fundamental choice of any student is often choosing between a behavior connected to a larger more substantial positive reinforcer and another behavior that delays the prior reinforcement. That is to say those students are often pitted with the decision to choose between studying and making good grades to help them proceed along their academic path to succeed, or to delay that success by getting distracted (Groenewoud and Schouwenburg, 2000).

In conclusion, the substantial research effort for this project is centered on solving the current problems relating to personal well-being while living in a space constrained environment. The overcrowding of residence halls, especially that of residents living in triple room units, adversely affects a
resident's ability to meet academic expectations of their collegiate level courses. It is highly plausible that by improving, if not removing, the constraints of limited space in the residence halls and making resident rooms more conducive to their needs, the level of satisfaction these students will encounter will correlate with the new standard for residents' quality of living.
IV. DESIGN

i. INTRODUCTION

Freshmen students living on campus at Cal Poly San Luis Obispo are given the opportunity to live in several freshmen style living arrangements on campus. There are three different residential living areas on campus available for freshmen and are the following: the Connection Halls which include Sierra Madre and Yosemite; the North Mountain Halls which include Diablo Hall, Lassen Hall, Whitney Hall, Shasta Hall, and Palomar Hall; and the Living Learning Program (LLP) Halls Fremont, Santa Lucia, Sequoia, Muir, Tenaya, and Trinity. All of these halls are meant to provide an environment where freshmen residents can fully be integrated into their living environments and become enriched by their personal and social surroundings.

As a Resident Advisor my job was to ensure that freshmen residents were comfortable in their new environments so that they could pursue their academics and excel in their studies. However, with every ongoing year newly admitted freshmen are becoming more challenged by Cal Poly’s rigorous academic requirements that are strictly enforced to keep them on track to graduating on time. As a result freshmen students that cannot cope with the intense academic atmosphere of Cal Poly end up leaving after their first year.

Nevertheless, this occurrence of freshmen leaving after spending one year at Cal Poly SLO is known as a “First-Time Freshman Persistence Rate” which is depicted in Figure 1. The highest drop-out figure for freshmen students belonged to the fall 2007 term where over 400 freshmen discontinued their education with Cal Poly and over 60 freshmen were academically dismissed.

![Student Leaves After 1 Year](Source: www.ipa.calpoly.edu/publications_reports/ret_grad/index.html)
due to poor performance. While the combined percentages discontinuing or dismissed freshmen students in fall 2007 fall below 15% of that year’s total incoming freshmen class, it still represents a concern over what affects students’ performance. There are freshmen students that drop out based on two classifications: academic disqualification or discontinuation. Academic disqualification occurs when the student’s cumulative grade point average falls below a 2.0 or the continual failure of major and support classes resulting in a consecutive referral to administrative probation and eventually dismissal. Students who do discontinue do so for reasons pertaining to social (i.e. don’t like the campus, faculty, area) or personal (i.e. family problems, money issues) problems.

Students living on campus are prone to being influenced heavily by their environments from the friends they choose to hang out with to the study groups they form for their classes. However, the dorm room environment is an aspect that is overlooked in respect to what influences freshmen residents while attending their first year at Cal Poly SLO. Freshmen residents living in the Living Learning Program (LLP) halls are given the option to live in traditional double living arrangements (two students per dorm room) or newly inducted triple living arrangements (three students per dorm room). While traditional two person living arrangements are the norm, three students living in the same living space as two individuals presents itself to be a growing problem in the LLP halls.

Figure 2: Double living arrangements are ideal for freshmen students
ii. TRIPLE LIVING ARRANGEMENTS

Residents living in “triples,” as they’re called, are subject to a living space with a floor space of 13 feet by 11 feet and a height of 9 feet. The room is furnished with one bunk bed and one loft bed that doubles as a two person desk. The third roommate is given a drop-leaf desk that is positioned in the far corner of the room right near the window. Two residents use the default stationary closets they are given while the third roommate uses a combination of a wardrobe and dresser. The rest of the furnishings include two “three” drawer dressers (or storage units) and three “three” drawer pedestal, two trash bins and a recycle bin, and a storage shelf for the roommate that gets the drop-leaf desk. Figure 3 below shows the layout of a default triple living arrangement.

![Figure 3: Triple living arrangements for freshmen residents in Living Learning Program halls](image)
The lack of space each resident in a triple gets has become an issue with not only the parents of the students but also for the students themselves. Several of my own residents on my floor that live in triples have complained to me about the difficulty of moving around in the room when all occupants are present. Not only has movement become an issue, but safety as well. The third roommate that uses the drop leaf desk in the corner of the room is given very little space between his/her desk and the wall behind. This space is a little less than two feet in length and presents itself as a cramped space not suitable for larger individuals. The space between bunk/loft beds and the stationary closets is approximately 2 feet wide, which presents a problem since freshmen residents cannot utilize the space for changing, putting or pulling out belongings in the closet safely and effectively. The distance from bed to bed is a little over four feet, which grants residents little space to move around in when trying to exit the room or get to their desks, closets, or dressers. Another problematic area has been the bunk and loft beds. There are no available ladders to safely climb onto the top bunk bed. Residents are subject to having to climb haphazardly along the back or front ends of the beds to get into bed. These problems have been a growing issue with my residents not only on my floor but on all floors of Santa Lucia.

The issue of space also becomes an issue for personal matters such as roommate conflicts.
stemming from the lack of space. While roommates living in doubles are not susceptible to conflicts, roommates in triples have a greater chance of developing these problems since they are all in close quarters with one another. This close proximity presents itself to be an impending factor in conflict as residents still want to maintain their level of personal space and sense of independence. All of these issues have been constantly brought up to my attention the entire year as my job of being a Resident Advisor in the engineering dorm Santa Lucia/North Mountain halls resulting in me developing steps to remedy the current livelihood of the LLP’s “triple”.

In the fall of 2009 I created an end of the quarter survey for my specific residents living in triples. The survey addressed issues such as space, sleeping schedules, and safety issues each roommate had while living in a triple. For that Fall I took that aggregate data from the survey and looked at what issues my residents faced the most while living in triples. Their comments were not entered into the data analysis; however, they were taken into account and were logged for later uses. I chose to take a small sample size, restricting my survey to my residents on my floor only since a majority of them knew who I was and were comfortable around me. Of the 16 triple living arrangements on my floor in Santa Lucia, only 10 out of the 16 rooms replied to my survey. However, these 30 residents from the 10 rooms that did reply helped me pinpoint some key areas that were important in this project. In conducting this survey I categorized my initial questions for the survey with the triple room arrangements into four areas: space, arrangement of room furniture, study environment, and sleep environment. These questions were general in nature and inquired into aspects such as whether or not the resident feels they have enough space to move around

![Survey Results for "Triples"](image)

*Figure 6: Survey conducted in fall 2009 for living conditions in "triples"*
in respect to their height and build to whether they would want to rearrange the furniture to accommodate their needs. They were answered in a simple “yes” or “no” manner. Questions from the survey that residents were asked can be found in the appendix. In looking at Figure 6 all residents that did participate in the survey felt it necessary to address the space conditions they live in, see if they could arrange their furniture in ways that would remedy the space issue, and make their rooms more conducive to studying and sleeping since space encroaches on these areas as well. In looking at Figure 6 we see that 90% of freshmen residents living in triples want the space issue addressed with even more wanting to improve their rooms for studying purposes. A general comment regarding the rooms was that there was not enough space to place all their study material adequately on their desk and floor without feeling overcrowded and overwhelmed.

iii. DEFINING REQUIREMENTS

With the data taken from the survey I was able to define student requirements for an ideal room for freshmen living in the LLP halls. Freshmen want more room to move around in and overall a room that gives them options for further customization. However, these requirements had to be in accordance with the dimensions of the room itself as well as with safety regulations for living quarters in the State of California. A tool had to be developed to measure these requirements in order to find what areas could be improved and how they could be improved with the resources that were readily available. Initially, I looked into the available floor space of both a double living arrangement and a triple living arrangement. I took into account for both of these room set ups that the stationary closets were not movable in any way and were thereby distinguished as non-usable floor space.
Figure 7: Two-person living arrangement ("double") for Living Learning Program Hall residents

With a given floor dimension of 13 feet by 11 feet a double has approximately 118 square feet of available space and is furnished with the following items: two twin sized mattresses, two desks, two dressers, two closets, two book shelves, two chairs, two trash bins and two recycle bins. These rooms could be easily customized to fit the needs of the residents as space was not an issue in these rooms. Because of this, residents living in double living arrangements were excluded from the survey since the focus of this project dealt with utilizing existing space in a crowded living arrangement that exists only in the “triple”.

Each triple living arrangement comes furnished with the following default items:

- 1 loft bed that accommodates an 80 inch x 36 inch mattress
- 1 bunk bed that accommodates an 80 inch x 36 inch mattress
- 2 stationary closets that each measure 48 inches x 26 inches
- 1 drop leaf work-surface measured at 18 inches x 24 inches
- 1 hang-on flipper door unit
- 3 mobile pedestals measured at 22 inches x 15 inches x 25 inches
- 1 combination wardrobe measured at 24 inches x 36 inches x 76 inches
- 2 freestanding 3-drawer dresser units
- 2 trash bins
- 1 recycle bin

This original room layout has 49% space utilization given nothing is remodeled and removed. The furniture comes “as is” according to University Housing standard room layouts in all triple living arrangements. Residents have approximately 61 square feet of available space, granting them 51% of free space to work and live in.

iv. INITIAL CONCEPTS

In order to address the living conditions of triples I had to design an ergonomic checklist that would be utilized for space accommodation in the LLP halls. This checklist would be used as an ongoing evaluation tool for room layouts in doubles and triples. It will be used to standardize the dormitory room layouts to ensure that the residents are living in a safe and comfortable environment.

Alternatives to the triple living arrangements would also be designed so as to arrange furniture in a manner that creates more room and is more conducive to the students’ needs, which in this case is space. A lot of residents had an issue with available floor space in the triple living arrangements, and given the circumstances that the LLP halls will still be in use for housing freshmen in the future the room’s stationary closets became somewhat of a topic of interest that will be addressed later on.
v. DEVELOPING AN ERGONOMIC CHECKLIST

The dorm rooms were looked at in the perspective of a livable “work environment”. The ergonomic checklist covered specific areas of interest such as the general student work station, wardrobe, bed, windows, temperature, ventilation, and miscellaneous items. The ergonomic checklist was created with the dorm room in mind and had additional areas of interests added for the sake of addressing them.

The general student workstation was a priority on this list because many residents living in triple living arrangements felt that their workspaces were a bit cluttered. In this category were the sub areas of posture, seating, and environmental space. These are standard areas of interest in any workstation ergonomic checklist since they address the most basic needs such as comfortable chairs and desks that promote healthy posture when working.

The next area of interest was the wardrobe and closet area of the room. Once again, the issue of space became apparent as residents had very limited movement between their beds and the two stationary closets prompting this to be addressed and remedied right away. This area of the checklist focused on a more user-friendly closet that allowed residents to better organize their belongings since space was an issue.

The bed was another area of interest since it presented some obvious hazards. First, there was no sufficient means of safely climbing into the top bunk bed. A ladder was lacking, and as a result residents were often faced with developing creative ways of getting into bed that put them at an increased risk of falling while trying to get up into bed. Second, there was the issue with space between the top bunk bed and the ceiling as several residents complained about hitting their head while getting up after sleeping.

The remaining areas of interest included the windows, temperature and ventilation of the room, and miscellaneous items pertaining to specific areas of the room’s furnishings. The checklist was
designed to be used to evaluate each set up of the several dorm room layouts, some of which were
customized by the residents themselves which was considered a violation of their terms and conditions
with University Housing. Nevertheless, this checklist would be used to ensure the safety of all
individuals choosing to live in triple living arrangements in the following years.
### Figure 9: Ergonomic Checklist for Living Learning Program Halls

<table>
<thead>
<tr>
<th>Area of Interest/Sub-area</th>
<th>Yes/No</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. General Student Workstation (Desk)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student desk and equipment have sufficient adjustability so you are in a safe working posture and can make occasional changes in posture while performing academic related tasks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desk is maintained in serviceable condition and functions as intended.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1.1 Posture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student is sitting against the back of your chair while he/she works?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the student's head/neck upright and centered over their shoulders when looking at the computer screen or documents?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the student's shoulders relaxed when using the keyboard and mouse?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the student's arms close by their sides when they use the keyboard?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the student's wrists in a neutral position (aligned with their forearm) when keying or using the pointer?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the student's wrists in a neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the student avoiding awkward postures such as an extended finger or thumb when using the keyboard and/or mouse?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1.2 Seating</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the backrest of the chair provide support for student's lower back?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the seat width and depth accommodate the specific user (sit area not too big/small)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the seat have proper cushioning that allows for proper “breathing”?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the seat front press up against the back of the student's knees?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the front of the seat properly rounded and cushioned (no sharp edge)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the student have sufficient head space when working at their desk (student does not have to duck/bow head when seated)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1.3 Environment Space</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Do the student's thighs have sufficient clearance space between the top of the thighs and the desk table?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the student's legs and feet have sufficient clearance space under the work surface so they are able to get close enough to the keyboard/input device?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the student have sufficient elbow room to move around in?</td>
<td>Can arms be bent and positioned horizontal to desk without running into another object/student?</td>
<td></td>
</tr>
<tr>
<td>Does the room have high quality fluorescent ceiling mounted light fixtures?</td>
<td>Consider Energy Star</td>
<td></td>
</tr>
<tr>
<td>Do the light fixtures provide glare-free lighting?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the desk's work surface have a matte finish to reduce light reflection and glare?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the desk provide enough space?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the resident have at least a foot of clearance behind themselves?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**2. Wardrobe (Closet)**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the closet have height adjustable poles?</td>
<td></td>
</tr>
<tr>
<td>Does the closet have height adjustable shelving?</td>
<td></td>
</tr>
<tr>
<td>Does the closet doorway have at least 36 inches of clearance?</td>
<td></td>
</tr>
<tr>
<td>Does the closet area have sufficient glare-free lighting?</td>
<td></td>
</tr>
<tr>
<td>Does the closet have a good source of fluorescent lighting and is the switch easily accessible?</td>
<td></td>
</tr>
<tr>
<td>Are the closet door handles easily accessible?</td>
<td></td>
</tr>
</tbody>
</table>

**3. Bed**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the student sleeping on the top bunk bed have at least 36 inches of clearance space between the top of their head and the ceiling?</td>
<td></td>
</tr>
<tr>
<td>Does the bunk bed have a sufficient ladder to allow for student to climb into bed?</td>
<td></td>
</tr>
<tr>
<td>Is the bunk bed adjustable?</td>
<td></td>
</tr>
<tr>
<td>Does the bunk bed have a guardrails on at least three sides of the bed (top, bottom, left or right side)?</td>
<td></td>
</tr>
<tr>
<td>Are the guardrails slip-free and easy to grab on</td>
<td></td>
</tr>
</tbody>
</table>
4. **Windows**

- Window sill in bedroom has at least a 30 inch height maximum from the floor.
- Does the window provide glare-free natural sunlight?
- Do the windows have curtain, drapes, or blinds that block sunlight/glare?
- Do the blinds, drapes, or curtains adequately adjust to changing sunlight?
- Is the locking latch mechanism on the window easily accessible?

5. **Temperature**

- Is the student comfortable with ambient temperatures?
- Is there a thermostat that can adjust room temperature?
- Is the thermostat easy to understand so that the student can make an educated choice on room temperature they want?  
  Are the different levels of climate control distinguishable?

6. **Ventilation**

- Is the air circulation sufficient?
- Is the air quality satisfactory?

7. **Miscellaneous**
vi. DEVELOPMENT OF ALTERNATIVE LAYOUTS

Designing alternatives for triple living arrangements was imperative to finding out the best available layout. Residents living in triples often resorted to moving around the furniture themselves and several of these layouts that they had arranged themselves were out of the pure need for space to move around in.

Development of Alternative 1

Due to limited amount of space in a triple living arrangement residents had looked into ways of arranging their rooms that would maximize their usable floor space, given the constraints of the room itself. Residents had arranged their room into the shape of an “L”. The original triple layouts had the bunk bed and loft bed parallel to one another and were aligned against the walls of the room. The newly arranged room granted a small square area on the left side of the room that measured approximately 33 square feet of usable floor space. The third roommate using the drop-leaf work surface was placed at the front of the room towards the stationary closet. With no where to place the combination wardrobe, it’s place was often in the small square area of space located to the left of the room which was still a more viable option then placing it anywhere else.

The most obvious advantage to this room arrangement was the freeing up of floor space for all three roommates and the availability of an area where at least two out of the three roommates could move around freely and not be obstructed by the room’s furnishings. However, the disadvantage still lay with the third roommate that used the drop leaf work surface because he/she would still be pressed closely up against the stationary closet thereby limiting space behind them. Another disadvantage was the fact that the 3-drawer dresser of one of the roommates was out of reach. This resulted in the resident having to crawl under the bunk bed in a small space that was limited due to the placement of the loft bed/desk combination.
Figure 10: Triple Living Arrangement Alternative 1

Calculated Free Space

Given the dimensions of the room (13’ x 11’ x 9’) the available space that residents using this alternate layout were granted a total of 62 square feet of available floor space that gave them . This alternate layout was able to give residents approximately a free space to total room area ratio of 53%. This ratio means that residents have up to 53% of usable space that they can utilize. Usable space was considered to be an area that a resident could stand in; therefore, spaces that were free but too narrow for residents to stand in were not considered in the space calculations.
Development of Alternative 2

This alternative was another adoption of resident’s creativity in room arrangement. Residents had arranged their room into the shape of an “L” in a similar fashion to the first alternative. However, the noticeable difference was the placement of the drop leaf work surface and the bunk bed. The newly arranged room had one end of the bunk bed placed flushed up against the stationary closet resulting in absolutely no space to access the closets.

In this layout the advantage was the increase in available floor space at the center of the room. The newly arranged room granted an area of 39 square feet at the center of the room and allowed for an even greater amount of free room to move around in. Once again the combination wardrobe is placed in a similar fashion as done in alternative 1. The combination wardrobe lies up against the wall and still proves to be an “eyesore” for residents wanting a clutter free area in the center of their room.

The most obvious advantage to this room arrangement was the decrease in utilized floor space and an increase in free floor space for all three roommates. Another advantage to this room layout alternative was the addition of space behind the roommate using the drop leaf work surface. This removes the feeling of being “trapped” in a corner as in the original layout for triple living arrangements. However, the disadvantage was the lack of integrating the third roommate’s combination wardrobe into the room seamlessly. Its position in the room disallows the use of a larger less obstructed layout. Another disadvantage to this layout is the fact that the 3-drawer dresser of one of the roommates is still out of reach. This once again results in residents having to crawl underneath the bunk bed in a small space in order to access their belongings.
Calculated Free Space

Given the dimensions of the room (13’ x 11’ x 9’) the available space that residents using this alternate layout were granted a total of 66 square feet of available floor space that gave them . This alternate layout was able to give residents approximately a free space to total room area ratio of 56%. This ratio means that residents have up to 56% of free space to utilize. Usable space was considered to be an area that a resident could stand in; therefore, spaces that were free but too narrow for residents to stand in were not considered in the space calculations.
Development of Alternative 3

This alternative was not another adoption of resident’s creativity, but rather instead it was suggested by residents. The use of the stationary closets, though large in size and granting greater area of storage space, was a problem for residents living in triples due to the fact that it was not movable. Due to their stationary nature, residents felt that these closets were another limiting factor in their customizations of their room layouts. Residents have also complained that these aging closets are falling apart and present a serious hazard. For example, the door can become unhinged resulting in injury if the resident is not paying attention.

This alternative takes that issue residents have with the stationary closets and aims to remove them since they can free up a significant amount of space. Also, the removal of these stationary closets can allow University Housing to implement two more combination wardrobes that are significantly smaller yet more effective at residents being able to organize their belongings. The two combination wardrobes would be placed in the original location of the stationary closets and would have their doors face inward towards the center of the room granting them easier access to their belongings. The bunk bed and loft bed/desk would assume their default positions in the room; however, they would be pushed back further against the wardrobes since the doors now face inwards towards the room and not towards the ends of the beds.

The advantages for this room are noticeable in that it allows for an increase in furniture being seamlessly placed and integrated into the room. This creates a much more fluid environment that residents can move around in without having to worry about furnishings such as a combination wardrobe getting in the way of moving from one end of the room to another. Another breakthrough advantage would be the easy access residents can now have for their 3-drawer dressers that are underneath the bunk beds. Given the advantages, the only disadvantage would be the loss of storage space with the removal of the stationary closets.
Calculated Free Space

Given the dimensions of the room (13’ x 11’ x 9’) the available space that residents using this alternate layout would be increased to the entire room’s floor area of 118 square feet due to the placement of combination wardrobes that are smaller and more space efficient. The total amount of square feet available to residents has increased to 75 square feet granting them a free space to total room area ratio of 64%. This ratio means that residents have up to 64% of free space to utilize. Usable space was considered to be an area that a resident could stand in; therefore, spaces that were free but too narrow for residents to stand in were not considered in the space calculations.
vii. COST OF IMPLEMENTATION

Utilizing the ergonomic checklist designed for the LLP halls would have no cost associated with it. The cost to implement would run at zero cost to University Housing because it would be integrated into the existing role of the Resident Advisor to ensure that rooms comply with the checklist. As a mandatory part of becoming a Resident Advisor these advisors must undergo a training program that occurs over the span of a quarter as well as an additional two weeks before the start of the academic school year. Resident Advisors would be given these ergonomic guidelines to ensure that residents know their options in order to best compliment their first year experience living in the LLP halls.

The costs associated with implementing alternatives 1 and 2 are zero as well since these utilize existing furniture and room layouts. Also, these alternatives do not involve the cost of construction associated with adding or removing material, furniture, etc. The only alternative that has a price tag associated with its implementation is alternative 3 and that is because it requires the additional purchase of furniture as well as the removal of the stationary closets.

Costs Associated with Alternative 3

Implementing alternative 3 would involve renovating the triple living arrangement rooms. Getting price quotes for University Housing’s main contractor, Maino Construction was essential in understanding the economic price tag the overhaul would come with. Also, getting prices for the additional furniture that would be added to the triple living arrangements was done so through University Housing’s furniture distributor, KI Residence Hall Furniture. All of these price findings were made possible by University Housing Business Services (UHBS) and its project manager Scott Bloom who is in charge of all on campus living facilities.

Renovating the rooms in the LLPs involved several different sections on the job order contract. These sections were broken down in the proposal review provided by Maino Construction and included the following:
- Demolition of existing furniture

- Framing for the support of existing structures and new additions

- Electrical work

- Work done to the door

- Painting

- Sanding

Each section dealt with a different aspect in construction and requires the use of skilled labor. The time frame that construction would be done to the six Living Learning Program halls would span three months starting in June after spring quarter and ending in early September before the start of the new academic school year. The LLP halls would be vacated and would be readily available for renovation and construction during this time period.

The quantity was the amount that was deemed necessary for the overhaul of a single LLP hall and is designated a Unit of Measurement (UOM) to gauge the value. UOMs could be based on hourly rate, individual rates, or square footage, cubic yards, linear feet, etc. The unit price was as an “as is” quote from Maino Construction that takes into account the labor involved, construction material, and construction procurement costs in that specific section or area. The unite price takes into account overhead, profit, bonds, insurance, and contingency costs. The factor of 0.96 was a negotiable number that the Maino construction worked out with University Housing. This factor covers the anticipated work for this particular project and allows University Housing the opportunity to evaluate Maino Construction on their performance and qualifications with the established fixed price.
## Demolition

<table>
<thead>
<tr>
<th>Section</th>
<th>UoM</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Factor</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal of stationary closet</td>
<td>LF</td>
<td>1,290</td>
<td>$42.40</td>
<td>0.96</td>
<td>$52,508.16</td>
</tr>
<tr>
<td>Asbestos Removal</td>
<td>Hourly</td>
<td>667.00</td>
<td>$57.02</td>
<td>0.96</td>
<td>$36,511.05</td>
</tr>
<tr>
<td>Construction Debris Dumpster (includes delivery and pick up)</td>
<td>Each</td>
<td>20.00</td>
<td>$375.00</td>
<td>0.96</td>
<td>$7,200</td>
</tr>
<tr>
<td>Fork Lift Operator (7,000 to 8,999 lb at full time)</td>
<td>Per Week</td>
<td>2.00</td>
<td>$3,240.00</td>
<td>0.96</td>
<td>$6,220.00</td>
</tr>
<tr>
<td>Use of backhoe, dozer, loader, excavator or similar sized equipment (includes delivery and pick up)</td>
<td>Each</td>
<td>1.00</td>
<td>$472.79</td>
<td>0.96</td>
<td>$453.88</td>
</tr>
<tr>
<td>Remove, transport, install furniture</td>
<td>SF</td>
<td>22,951</td>
<td>$0.73</td>
<td>0.96</td>
<td>$16,084.41</td>
</tr>
<tr>
<td>Handling of material over 125’</td>
<td>CY</td>
<td>468</td>
<td>$3.03</td>
<td>0.96</td>
<td>$1,361.32</td>
</tr>
<tr>
<td>Handling of material over 125’</td>
<td>CY</td>
<td>107.5</td>
<td>$3.03</td>
<td>0.96</td>
<td>$312.70</td>
</tr>
<tr>
<td>Rubbish handling per CY of material/trip</td>
<td>CY</td>
<td>107.5</td>
<td>$3.49</td>
<td>0.96</td>
<td>$360.17</td>
</tr>
<tr>
<td>Rubbish handling per CY of material/trip</td>
<td>CY</td>
<td>468</td>
<td>$3.49</td>
<td>0.96</td>
<td>$1,567.97</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$122,559.66</td>
</tr>
</tbody>
</table>

Figure 13: Cost breakdown for demolition

## Framing

<table>
<thead>
<tr>
<th>Section</th>
<th>UoM</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Factor</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom Shaped Birch</td>
<td>LF</td>
<td>5,376.00</td>
<td>$3.38</td>
<td>0.96</td>
<td>$8,722.02</td>
</tr>
<tr>
<td>Wall Framing</td>
<td>LF</td>
<td>300.00</td>
<td>$1.05</td>
<td>0.96</td>
<td>$302.40</td>
</tr>
<tr>
<td>For quantities &gt; 200 to 500, Add</td>
<td>LF</td>
<td>250.00</td>
<td>$0.18</td>
<td>0.96</td>
<td>$43.20</td>
</tr>
<tr>
<td>Treated blocking to concrete (carpet)</td>
<td>LF</td>
<td>350.00</td>
<td>$2.29</td>
<td>0.96</td>
<td>$769.44</td>
</tr>
<tr>
<td>Interior BC Plywood wall sheathing</td>
<td>SF</td>
<td>450.00</td>
<td>$1.51</td>
<td>0.96</td>
<td>$652.32</td>
</tr>
<tr>
<td>For exterior CC grade plywood, Add</td>
<td>SF</td>
<td>450.00</td>
<td>$0.08</td>
<td>0.96</td>
<td>$34.56</td>
</tr>
<tr>
<td>Selective replacement of damaged plywood</td>
<td></td>
<td>450.00</td>
<td>$1.49</td>
<td>0.96</td>
<td>$643.68</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$11,167.62</td>
</tr>
</tbody>
</table>

Figure 14: Cost breakdown for framing

## Electrical Work

<table>
<thead>
<tr>
<th>Section</th>
<th>UoM</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Factor</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; EMT with 4 #12 THHN/THWN Install</td>
<td>CLF</td>
<td>7.00</td>
<td>$470.28</td>
<td>0.96</td>
<td>$3,160.28</td>
</tr>
<tr>
<td>1/2&quot; EMT with 4 #12 THHN/THWN Demo</td>
<td>CLF</td>
<td>7.00</td>
<td>$181.77</td>
<td>0.96</td>
<td>$1,221.49</td>
</tr>
<tr>
<td>1/2&quot; Flexible Steel Screw in connector Install</td>
<td>EA</td>
<td>228.00</td>
<td>$3.01</td>
<td>0.96</td>
<td>$658.83</td>
</tr>
<tr>
<td>1/2&quot; Flexible Steel Screw in connector Demo</td>
<td>EA</td>
<td>228.00</td>
<td>$1.99</td>
<td>0.96</td>
<td>$435.57</td>
</tr>
<tr>
<td>1 Gang 4-1/2&quot; x 1-5/8&quot; Box; outlet Install</td>
<td>EA</td>
<td>112.00</td>
<td>$24.75</td>
<td>0.96</td>
<td>$2,661.12</td>
</tr>
<tr>
<td>1 Gang 4-1/2&quot; x 1-5/8&quot; Box; outlet Demo</td>
<td>EA</td>
<td>112.00</td>
<td>$11.50</td>
<td>0.96</td>
<td>$1,236.48</td>
</tr>
</tbody>
</table>
Figure 15: Cost breakdown for electrical work

<table>
<thead>
<tr>
<th>Description</th>
<th>UOM</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Factor</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Gang, 15A, 120/227 V Switch Cover Install</td>
<td>EA</td>
<td>112.00</td>
<td>$119.76</td>
<td>0.96</td>
<td>$12,876.60</td>
</tr>
<tr>
<td>4 Gang, 15A, 120/227 V Switch Cover Demo</td>
<td>Ea</td>
<td>112.00</td>
<td>$32.76</td>
<td>0.96</td>
<td>$3,522.36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$25,772.73</strong></td>
</tr>
</tbody>
</table>

Door Work

<table>
<thead>
<tr>
<th>Section</th>
<th>UOM</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Factor</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove/Reinstall Wood Door</td>
<td>EA</td>
<td>120.00</td>
<td>$64.18</td>
<td>0.96</td>
<td>$7,393.54</td>
</tr>
<tr>
<td>Remove/Reinstall, Add</td>
<td></td>
<td>4.00</td>
<td>$64.18</td>
<td>0.96</td>
<td>$246.45</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$7,639.99</strong></td>
</tr>
</tbody>
</table>

Sanding

<table>
<thead>
<tr>
<th>Section</th>
<th>UOM</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Factor</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet Sand/Hand Scrape, Prep</td>
<td>SF</td>
<td>2,400.00</td>
<td>$2.17</td>
<td>0.96</td>
<td>$4,999.68</td>
</tr>
<tr>
<td>Wet Sand/Hand Scrape, Prep, Add</td>
<td>SF</td>
<td>80.00</td>
<td>$2.17</td>
<td>0.96</td>
<td>$166.66</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$5,166.34</strong></td>
</tr>
</tbody>
</table>

Painting

<table>
<thead>
<tr>
<th>Section</th>
<th>UOM</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Factor</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint Interior, 1 coat primer, Brush/roller</td>
<td>SF</td>
<td>450.00</td>
<td>$0.41</td>
<td>0.96</td>
<td><strong>$177.12</strong></td>
</tr>
<tr>
<td>Paint Interior, 2 coat primer, Brush/roller</td>
<td>SF</td>
<td>450.00</td>
<td>$0.83</td>
<td>0.96</td>
<td><strong>$358.56</strong></td>
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<tr>
<td>Polyurethane - Per Coat</td>
<td>SF</td>
<td>5,376.00</td>
<td>$0.51</td>
<td>0.96</td>
<td><strong>$2,632.09</strong></td>
</tr>
<tr>
<td>Stain wood trim, wipe off up to 6&quot; wide</td>
<td>LF</td>
<td>2,688.00</td>
<td>$0.63</td>
<td>0.96</td>
<td><strong>$1,625.70</strong></td>
</tr>
<tr>
<td>Varnish, 3 coats, sand, coat per face</td>
<td>EA</td>
<td>240.00</td>
<td>$66.69</td>
<td>0.96</td>
<td><strong>$15,365.38</strong></td>
</tr>
<tr>
<td>Varnish, 3 coats, sand, coat per face, Add</td>
<td>240.00</td>
<td>$66.69</td>
<td>0.96</td>
<td><strong>$15,365.38</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$35,524.22</strong></td>
</tr>
</tbody>
</table>

Addition of New Furniture to Existing Triple Living Arrangements Rooms

The addition of new furniture is included for the overhaul of a single LLP Hall. The price quotes were made available through University Housing Business Services contact Tony Rusen from KI Residence Hall Furniture. The furniture will cover the 48 triple living arrangement rooms in every LLP.
Hall and since every triple being renovated will require 2 combination wardrobes that amount is multiplied to give a total of 96 units per LLP hall. The bunk bed was given a ladder whereas the loft bed/desk was not. This is due to the restriction of space putting a ladder on the loft bed.

<table>
<thead>
<tr>
<th>Type of Furniture</th>
<th>Qty</th>
<th>Unit Cost</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination Wardrobe</td>
<td>96</td>
<td>$1083.76</td>
<td>$104,040.96</td>
</tr>
<tr>
<td>Ladders</td>
<td>48</td>
<td>$257.00</td>
<td>$12,336.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$116,376.00</strong></td>
</tr>
</tbody>
</table>

Figure 19: Cost breakdown for additional furniture

V. METHODOLOGY

The use of the ergonomic checklist that was created to evaluate a dorm room set up, specifically the triple, would determine which layout alternative provided the optimal amount of floor space utilization and gave the most “free” floor space. The use of the ergonomic checklist was tested against all possible layouts. This meant that both the existing layouts for double and triples would be included as well and tested against the other three alternative layouts that were developed, bringing the total of layouts being tested to five. The third alternative of course was tested in practice by envisioning the removal of the stationary closets and placing the ideal locations of the new furniture. Resident feedback through interviews and surveys also helped shaped the approach that was used to find an optimal layout for triple living arrangements.

When evaluating each room layout I approached the residents with a professional attitude. I told the residents of each triple I studied to be relaxed and perform their normal day to day activities as if I were not there in their room. My evaluation set up included doing the following:

- Observed each resident in the room and scored accordingly
- Took notice of constant readjustment of residents when using their work surfaces
- Asked each resident to leave and enter the room while the other two roommates stayed inside
- Asked each resident to access their closet/storage space/dresser

The evaluation process followed an all-or-nothing scoring process in that if any of the three residents in the room did not pass any question on the ergonomic checklist when compared to all three checklist evaluations, the final verdict for that specific question would be a “No”. The reasoning behind this was that if one resident was uncomfortable with a particular feature of their room, that particular area was unfavorable and therefore no resident would want it.

The ergonomic checklist was created in a manner that the more “Yes” answers that each layout scored resulted in a better ranking of that layout and allowed me to gauge what features about each room layout needed possible improvement. The more “No” answers on each layout would result in a lower ranking thereby affecting the possibility of that layout being an optimal choice among all the layouts. In going through each layout special attention was given to the areas that residents had complained about through interviews and survey questionnaires issued at the early stages of this project.

The process about redesigning the room layouts followed a similar approach in that it utilized surveys and interviews with residents that lived in triple living arrangements. Possible areas of improvement were looked into and other alternatives that residents themselves had created were studied and adopted. Learning the modular nature of the room’s furnishings allowed for greater success in determining how to arrange the room in order to provide the seamless integration of its furniture. Areas that were free of furniture were considered “free” space and their dimensions were noted.

VI. ANALYSIS

Double Living Arrangement

In going through the double living arrangement layout the ergonomic checklist was applicable in all areas with the exception of the bed section. Since doubles are given single bed frames/mattresses
there were no issues regarding inadequate features that threatened the safety and well-being of residents. Doubles scored remarkably well with the exception of the area of desk maintenance. Apparently, some of the desks in the doubles are damaged with scratches and stains that residents complained about early in the quarter. However, these blemishes, as distractive as they are, do not play a significant impact in the evaluation.

**Triple Living Arrangement (Default Layout)**

In going through the default triple layout the ergonomic checklist scored relatively low compared to the double living arrangements. A huge factor in the default triple layout scoring so poorly was the lack of space residents had on their work surfaces, the lack of space behind themselves when sitting down, the lack of a ladder to climb into bed, and the lack of adequate space for easy access to the closets.

The layout gave residents approximately 61 square feet of free space with 49% of the floor space being utilized by default furniture provided for by University Housing. The ergonomic evaluation results for the layout was a score of 23 “Yes” answers and 20 “No answers.

**Triple Living Arrangement Alternative 1**

In reviewing the existing room layout currently being used by residents, there is a slight increase in free space in the room; however, it does not grant a huge increase that is optimal. There are still areas that stick out such as the drop leaf work surface. This area still has the resident being pressed up against another obstacle.

The layout gave residents approximately 62 feet of free space with 47% of the floor space being utilized by default furniture provided for residents by University Housing. The ergonomic evaluation
results for the layout had a score of 26 “Yes” answers and 17 “No” answers ranking it slightly higher than the default layout.

**Triple Living Arrangement Alternative 2**

Once again this room layout is currently being utilized by residents in the LLP halls. There is a slight decrease in the amount of floor space being utilized by furniture in the room; however, once again the change is marginal and is not that noticeable. The combination wardrobe still sits in the middle of an area that “looks” to be a larger area of free space but still proves to be an obstacle for residents.

The layout gave residents approximately 66 square feet of free space with 44% of the floor space being utilized by default furniture provided for residents by University Housing. The ergonomic evaluation results for the layout had a score of 28 “Yes” answers and 15 “No” answers ranking it slightly higher than the first alternative and significantly higher than the original default layout.

**Triple Living Arrangement Alternative 3**

This layout was tested in a hypothetical environment and provided a significant decrease in space utilized by dorm room furniture. The change was significant in both the floor layout and ergonomic evaluation. The room’s furniture is significantly integrated into the residents’ space and does not block or restrict their movement in any way. The problem of the wardrobe being an obstacle is removed as it remains in the corner of the room up against the wall closest to the window.

The layouts improvements in both layout and ergonomic evaluation can be attributed to the removal of the stationary closets as well as the seamless integration of the furniture into the room’s setting. Additional furniture such as the ladders and combination wardrobes increase this layout’s score and also resident appeal. Though the room layout is not fully implemented many of my residents liked
the layout and felt that even though it still didn’t solve the issue with limited space in the vertical direction it solved the most pressing issue which was restricted movement and safety concerns.

The layout gave residents approximately 75 square feet of free space with 36 percent of the floor space being utilized by default furniture provided for by University Housing. The ergonomic evaluation result for the layout was a score of 36 “Yes” answers and 7 “No” Answers.

VII. DISCUSSION OF RESULTS

The results for the different layouts were astonishing as they showed what arrangement of room furnishings could affect the amount of space being utilized. The best choice for the triple living arrangement was the third alternative since it provided a significant increase in free space and had the least amount of utilized space. In looking at Figure 20 we see that Alternative 3 scored higher than all other layouts ranking it the highest and therefore the most optimal solution to the overcrowding situation in triple living arrangements.

The costs for implementing the third alternative would be based on increasing the desirability for freshmen residents living in triples in the LLP halls. The final cost analysis is shown below:

<table>
<thead>
<tr>
<th>Section</th>
<th>Cost</th>
<th>Qty</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition</td>
<td>$122,559.66</td>
<td>x 6</td>
<td>$735,357.96</td>
</tr>
<tr>
<td>Framing</td>
<td>$11,167.62</td>
<td>x 6</td>
<td>$67,005.72</td>
</tr>
<tr>
<td>Electrical Work</td>
<td>$25,772.73</td>
<td>x 6</td>
<td>$154,636.38</td>
</tr>
<tr>
<td>Door Work</td>
<td>$7,639.99</td>
<td>x 6</td>
<td>$45,839.94</td>
</tr>
<tr>
<td>Sanding</td>
<td>$5,166.34</td>
<td>x 6</td>
<td>$30,998.04</td>
</tr>
<tr>
<td>Painting</td>
<td>$35,524.22</td>
<td>x 6</td>
<td>$213,145.32</td>
</tr>
<tr>
<td>Additional Furniture w/ 8.25% CA Sales Tax</td>
<td>$125,977.02</td>
<td>x 6</td>
<td>$755,862.12</td>
</tr>
</tbody>
</table>
Figure 21: Cost breakdown for implementation of the third alternative in all six LLP halls

The total cost to renovate all six LLP halls comes out to $2,002,845.48. The cost analysis takes into account the different sections of required construction as well as the retail sales price (with California Sales Tax) for the additional furniture. The cost for this project makes legitimate sense in that the project revolves around renovation of Cal Poly’s existing buildings. In comparing costs to other on-campus housing projects like Poly Canyon Village (PCV) which cost University Housing approximately $240 million, this renovation project for the six LLP halls is a small exchange in price for freshmen residents wanting satisfaction and safety in their rooms.

Looking back at the Freshmen One Year Persistence rates of Figure 1 it is urgent to address the impact of a freshmen’s living environment on their performance in college. Student living environments play a significant role in shaping freshmen’s academic career as well as being a crucial factor in freshmen retention and satisfaction. If we can improve their environments and promote healthy and comfortable living standards that are conducive to the student's needs, they may be inclined to academically succeed. This would involve getting rid of the unnecessary distractions that stem from limited space (roommate conflict, injury, etc). Improving these aspects of freshmen residents’ living standards would have the possibility of lowering the rates at which freshmen students leave after one year. While some cases of students dropping out or getting disqualified may be the result of external factors beyond their environment (poor study habits, personal/social problems, etc) the economic impact it has on Cal Poly SLO is irreversible. The students that do leave after one year due to the conditions listed above would be a waste of time for professors, staff, and the University. Failing freshmen students would take up spots in classrooms that are intended for students who intend to take the class their first time around. This would result in the departments having to force open new sections to accommodate the increase numbers in enrollment in these types of classes. As a result, the department loses funds that can go towards improving their curriculum and faculty and staff are stretched to provide sufficient teaching and
office hours. While these costs cannot be determined without an exact number of students who do
leave due to environmental factors since no “exit” survey exists, the logic of the aggregate effects these
rate have on Cal Poly SLO’s budget makes sense. The problem is that students that do leave aren’t
required to fill out a survey as to why they intend to leave, or whether their environment did play an
important role in determining whether they intended to stay or not.

Though the project renovation lacks immediate or visible economic benefits, it does provide
benefits from a human factors and ergonomics point of view. The project addresses a majority of the
issues that freshmen residents were having with their default triple’s layout. And while some issues
such as the space clearance between the top bunk bed and the ceiling is a persistent problem in all triple
layouts, the issue will have to be resolved by University Housing having to lower the top bunks.
However, this would create further space constraints as residents who work and reside below the bunks
are subject to a lesser amount of head clearance with getting up out of their seats. This was a legitimate
problem for the project and would require further research into alternate methods or furnishings that
would address this properly. Given the scope of the project the deliverables can only be applied to the
six Living Learning Program halls. The different layouts are also limited to these six halls since the
preexisting conditions of overcrowding are currently visible only in the LLP halls. If triple living
arrangements were to be implemented into the Connection halls or in Cerro Vista Apartments, the
ergonomic checklist would have to be modified and the room layouts would be completely inadequate
to address any concerns that may arise in these settings.

VIII. CONCLUSION

The project addressed the most important issues brought up by freshmen residents living in the
six LLP halls. The most important results were the ergonomic benefits of the best alternative chosen to
be implemented in all the LLP halls. The benefits of seamlessly integrating existing room furniture in
triple living arrangements reaps astonishing results that can dramatically improve the desirability and
satisfaction of freshmen residents and can make the difference for a resident struggling to overcome their first year experiences as a student in college. I would say that I was able to achieve all the intended objectives and goals of my project. I created an ergonomic evaluation checklist to be used strictly for the six LLP halls. I used resident feedback through surveys and questionnaires to gauge the different layout alternatives, and then deciding on the optimum choice among the three different layouts. I created an environment that would be conducive to the students’ needs and increase their satisfaction of living in a triple living arrangement, despite the obvious limitations in space.
IX. WORKS CITED


Santa Lucia Third Floor Survey for Triples

Thank you for participating in this quick and easy survey. Your information will be used to help remedy the ongoing living arrangements here in the Living Learning Program Halls. Please take the time to answer each question as best you can.

Please circle one

1. Do you feel that you have adequate* space living in a triple? Y/N
   *Adequate space refers to you being comfortable enough to move without any restrictions

2. Do you feel that the room can be arranged to give yourself more space? Y/N

3. If you answered yes on question 2, what specific elements of the room (bed, dresser, closet, etc) would you move around?

4. Do you find it difficult to study in your room when all roommates are present? Y/N

5. Do you find it difficult to get a good night’s rest when all roommates are present? Y/N

6. Can you make any comments regarding the room in general?
Space Calculations for Triple Living Arrangements

Space Calculator for Triple Living Arrangement (Default)

118 sq ft available

\[ 8 + 11 + 40 + 2 \]

= 61 sq ft available

Slender areas next to desks in the corners of the room were ignored since it is space that can’t be effectively utilized
Space Calculator for Alt1

118 sq ft available

\[ 8 + 14 + 33 + 7 \]

= 62 sq ft available

Slender areas next to desks in the corners of the room were ignored since it is space that can’t be effectively utilized
Space Calculator for Alt2

118 sq ft available

8 + 39 + 4 + 15

= 66 sq ft available

Slender areas next to desks in the corners of the room were ignored since it is space that can’t be effectively utilized.
Space Calculator for Alt3

118 sq ft available

\[16 + 32 + 19 + 3 + 5\]

= 75 sq ft available

Slender areas next to desks in the corners of the room were ignored since it is space that can’t be effectively utilize
Calculations for Free Space to Total Room Area Ratio

Free space / available space x 100

Calculations for Utilized Space

Available space – Free space / available space x 100

1. Free Space to Total Room Area Ratio for Default Triple Layout

61 sq ft of available space / 118 sq ft of available space x 100 = 51%

Therefore, the space that is currently being utilized is 49% of the floor area

2. Free Space to Total Room Area Ratio for Alt 1 Triple Layout

62 sq ft of free space / 118 sq ft of available space x 100 = 53%

Therefore, the space that is currently being utilized is 47% of the floor area

3. Free Space to Total Room Area Ratio for Alt 2 Triple Layout

66 sq ft of free space / 118 sq ft of available space x 100 = 56%

Therefore, the space that is currently being utilized is 44% of the floor area

4. Free Space to Total Room Area Ratio for Alt 3 Triple Layout

75 sq ft of free space / 118 sq ft of available space x 100 = 64%

Therefore, the space that is currently being utilized is 36% of the floor area
### Ergonomic Checklist Evaluation Summaries

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double*</td>
<td>37</td>
<td>1</td>
</tr>
<tr>
<td>Triple (Default)</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>Triple Alt 1</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>Triple Alt 2</td>
<td>28</td>
<td>15</td>
</tr>
<tr>
<td>Triple Alt 3</td>
<td>36</td>
<td>7</td>
</tr>
</tbody>
</table>

*The section covering bunk beds and loft beds did not apply to the double, so this section was thrown out. This reduced the number of questions to 38.*
### Admissions Profile

**First-Time Freshmen**

<table>
<thead>
<tr>
<th>Year</th>
<th>Applicants</th>
<th>Selected</th>
<th>Selection Rate</th>
<th>Enrolled</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2003</td>
<td>20,828</td>
<td>7,962</td>
<td>38.4%</td>
<td>2,903</td>
<td>38.3%</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>22,561</td>
<td>8,528</td>
<td>37.8%</td>
<td>2,930</td>
<td>34.4%</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>23,691</td>
<td>10,051</td>
<td>44.5%</td>
<td>3,425</td>
<td>32.5%</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>26,724</td>
<td>12,453</td>
<td>48.6%</td>
<td>3,568</td>
<td>29.5%</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>30,170</td>
<td>13,520</td>
<td>44.8%</td>
<td>4,369</td>
<td>32.3%</td>
</tr>
</tbody>
</table>

**New Transfers**

<table>
<thead>
<tr>
<th>Year</th>
<th>Applicants</th>
<th>Selected</th>
<th>Selection Rate</th>
<th>Enrolled</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2003</td>
<td>4,066</td>
<td>1,396</td>
<td>34.3%</td>
<td>861</td>
<td>61.7%</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>4,511</td>
<td>1,352</td>
<td>30.0%</td>
<td>790</td>
<td>58.4%</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>4,047</td>
<td>1,768</td>
<td>43.7%</td>
<td>904</td>
<td>51.1%</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>4,230</td>
<td>1,561</td>
<td>39.3%</td>
<td>772</td>
<td>46.5%</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>4,179</td>
<td>1,623</td>
<td>38.8%</td>
<td>826</td>
<td>50.9%</td>
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</tbody>
</table>

**New Post-Baccalaureate**

<table>
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<th>Selected</th>
<th>Selection Rate</th>
<th>Enrolled</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2003</td>
<td>132</td>
<td>80</td>
<td>66.4%</td>
<td>53</td>
<td>70.8%</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>137</td>
<td>76</td>
<td>56.9%</td>
<td>54</td>
<td>85.9%</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>103</td>
<td>54</td>
<td>52.4%</td>
<td>40</td>
<td>85.2%</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>107</td>
<td>53</td>
<td>62.2%</td>
<td>50</td>
<td>79.5%</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>135</td>
<td>98</td>
<td>71.1%</td>
<td>74</td>
<td>77.1%</td>
</tr>
</tbody>
</table>

**New Graduate Students**

<table>
<thead>
<tr>
<th>Year</th>
<th>Applicants</th>
<th>Selected</th>
<th>Selection Rate</th>
<th>Enrolled</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2003</td>
<td>816</td>
<td>426</td>
<td>52.2%</td>
<td>264</td>
<td>62.0%</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>843</td>
<td>446</td>
<td>52.9%</td>
<td>254</td>
<td>57.0%</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>782</td>
<td>431</td>
<td>55.1%</td>
<td>271</td>
<td>62.9%</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>716</td>
<td>432</td>
<td>60.3%</td>
<td>314</td>
<td>72.7%</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>790</td>
<td>457</td>
<td>57.8%</td>
<td>331</td>
<td>72.4%</td>
</tr>
</tbody>
</table>

### New Student Enrollment Trends

- **First-Time Freshmen**
- **New Transfers**
- **New Graduate Students**
- **New Post-Baccalaureate**

Notes: New Transfer applied, selected, and enrolled numbers include second baccalaureates. New enrolled students include students who were selected in Fall but chose to begin in the Summer.
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