Improve Recruitment and Retention Based on Student Interests

Mrs. Katie Loughmiller, Kansas State University

Katie Loughmiller is an Assistant Professor of Architectural Engineering and Construction Science at Kansas State University holding the Martin K. Eby Distinguished Professorship. Her specific areas of interest include construction scheduling, construction finance, and retention and recruitment in STEM fields.

Katie Loughmiller received her Bachelor's Degree in Construction Science in Management from Kansas State University. As a professional, she worked as a Project Engineer and Project Manager in Austin, Texas. In this role, she was responsible for the management of construction projects ranging from $5-70 million. After spending 12 years in industry, Katie accepted a faculty position with the Department of Architectural Engineering and Construction Science at Kansas State University in Manhattan, KS. She received her Master's degree in Construction Management (2015) from North Dakota State University.

Katie is very involved in the Construction Industry though the National Association of Women in Construction (NAWIC), where she serves on the Board of Trustees for the NAWIC Education Foundation. She is also actively involved in the Associated Schools of Construction and currently serves as the Assistant Director of Region 4.

Dr. Julia A Keen P.E., Kansas State University

Julia Keen is a Professor of Architectural Engineering and Construction Science at Kansas State University holding the Bob and Betty Tointon Engineering endowed chair. She also owns her own consulting company, Keen Designs, PA. Her specific areas of interest include HVAC design, energy codes, high performance design, HVAC education, and the advancement of women in the building design and construction industry.

Julia Keen received her Bachelor's Degree in Architectural Engineering from Kansas State University. Upon graduation, she worked as a Mechanical/Electrical Project Engineer in Waterloo, Iowa. In this capacity she was responsible for the design of building systems from initial planning stages through final project inspection and completion. Julia was involved in new and retrofit projects including hospitals, health clinics, assisted-living and nursing facilities, education facilities, office buildings, retail facilities, dormitories, and churches. In July 2003, Julia accepted a faculty position with K-State in the Architectural Engineering and Construction Science Department. She completed her Master's degree in Architectural Engineering (2005) and her Doctorate (2010) in Education both from K-State. She is a Licensed Mechanical Professional Engineer in Kansas and Iowa and holds two ASHRAE Certifications - High-Performance Building Design Professional (HBDP) and Building Energy Audit Professional (BEAP).

In addition to her 9-month faculty appointment at K-State, Julia has the opportunity to stay current with the HVAC industry in a consulting capacity. Her consulting endeavors include performing as HVAC professional education consultant, engineering design, plan check and quality review, and acting as an owner's representative in facility planning and project implementation.

Julia is very involved in the engineering professional society, ASHRAE. She has served as the faculty advisor to the K-State Student branch since 2003. She currently holds the elected position of Society Vice President.

Miss Katherine Marie Benton, Kansas State University

Full Paper: Improving Recruitment and Retention Numbers in ARE/CNS

Background

Changes in the program curriculum for both Architectural Engineering (ARE) and Construction Science and Management (CNS) at a Midwest Public University resulted in a new joint orientation class. Orientation (ARE/CNS 100) is a required course for all new students to the ARE & CNS curriculum. The new course format was developed to provide exposure to both sides of the department in design and construction. This course is offered in both the fall and spring semester. The fall semester is typically dominated by true freshmen and the spring semester is commonly a smaller class of transfer students from other institutions and change of major students from within the university.

The desire to improve retention rates of underclassmen students in the department from early in the curriculum was the catalyst for this research. The hope was this data could be used to increase engagement of underclassmen in department sponsored activities as well as steering content coursework to areas of student interest. Additionally, the department would like to target recruitment efforts for prospective students using the collected information for the focus of departmental advertising and literature.

Research Questions and Survey

A survey was conducted using all students enrolled in ARE/CNS 100 course as the sample. This survey was administered electronically as the first homework assignment of the class. In addition to using the survey for research, the data collected was also used to assign students to groups for the semester based on shared commonalities.

The survey consisted of 18 questions: 13 multiple-choice, 4 select-all-that-apply, and 1 scale. The main categories utilized in this research were demographics and students' interests/hobbies.

All students were required to take the survey as a homework grade for the class. One of the questions in the survey gave the student the opportunity to opt out of having their response used as a part of the research. It was clearly communicated to every student that if they chose to not participate in the research, it would have no impact on their grade. All student responses remained anonymous. 95% of students elected to participate in the research.

Methods

The survey creation and data collection was conducted using the survey and data analysis platform Qualtrics. The survey was administered through Qualtrics every fall and spring semester of the ARE/CNS Orientation class beginning Fall 2014 and ending Fall 2016. Resulting in 5 semesters worth of data collected from 574 students, the breakdown can see below in Figure

1. The total overall breakdown of participating students was: 119 Females, 455 Males, 291 CNS students, 263 ARE students, and 20 Other Majors (typically students that are seriously contemplating changing majors but have not completed the required paperwork).
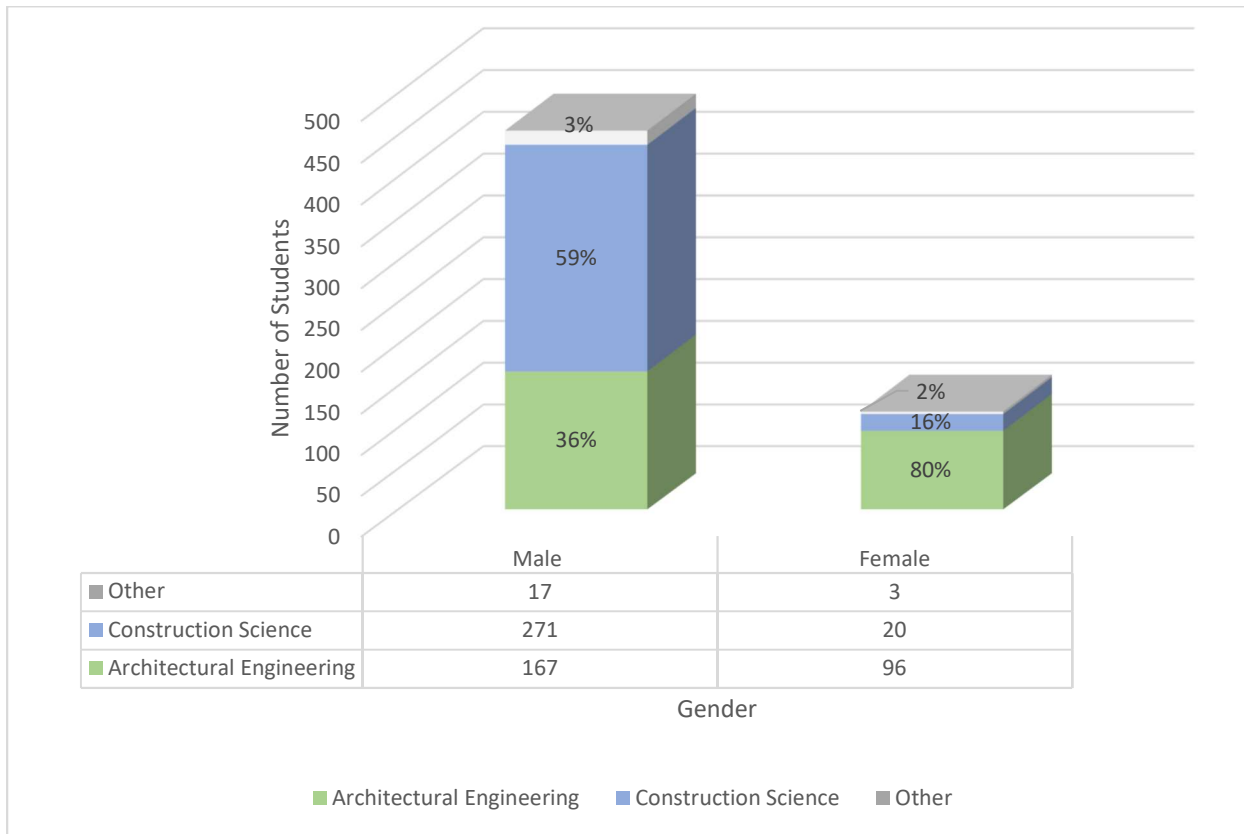

	Male	Female
▇ Other	17	3
▇ Construction Science	271	20
▇ Architectural Engineering	167	96

Figure 1: Major Breakdown Based on Gender

The ranges between the 5 semesters worth of data were as follows:

1. Female students per semester 17-25%
   Male students per semester 75-83%
2. Architectural Engineering students per semester 30-51%
   Construction Science and Management students per semester 46-60%
   Other Major per semester 1-9%
3. Domestic students per semester 94-98%
   International students per semester 2-6%

This research paper concentrates on the question:

How does a student's interests and hobbies relate to recruitment of students in the department?

This focus was selected because it has not previously been looked at in depth and it has the potential for the largest impact on both current and future students.

Results

To answer the research question, the first set of data analyzed was the hobbies of interest between ARE and CNS students. When students were asked to select their hobbies, they were able to select more than one. As seen in Figure 2 below, there are several distinct peaks in the top hobbies for both majors. The top 5 hobbies for ARE students was in order: Music, Watching Movies, Sports Watching, Physical Fitness/Exercise, and Sports Participant. The top 5 hobbies for CNS students was in order: Sports Watching, Physical Fitness/Exercise, Sports Participant, Watching Movies, and Camping/Hiking.
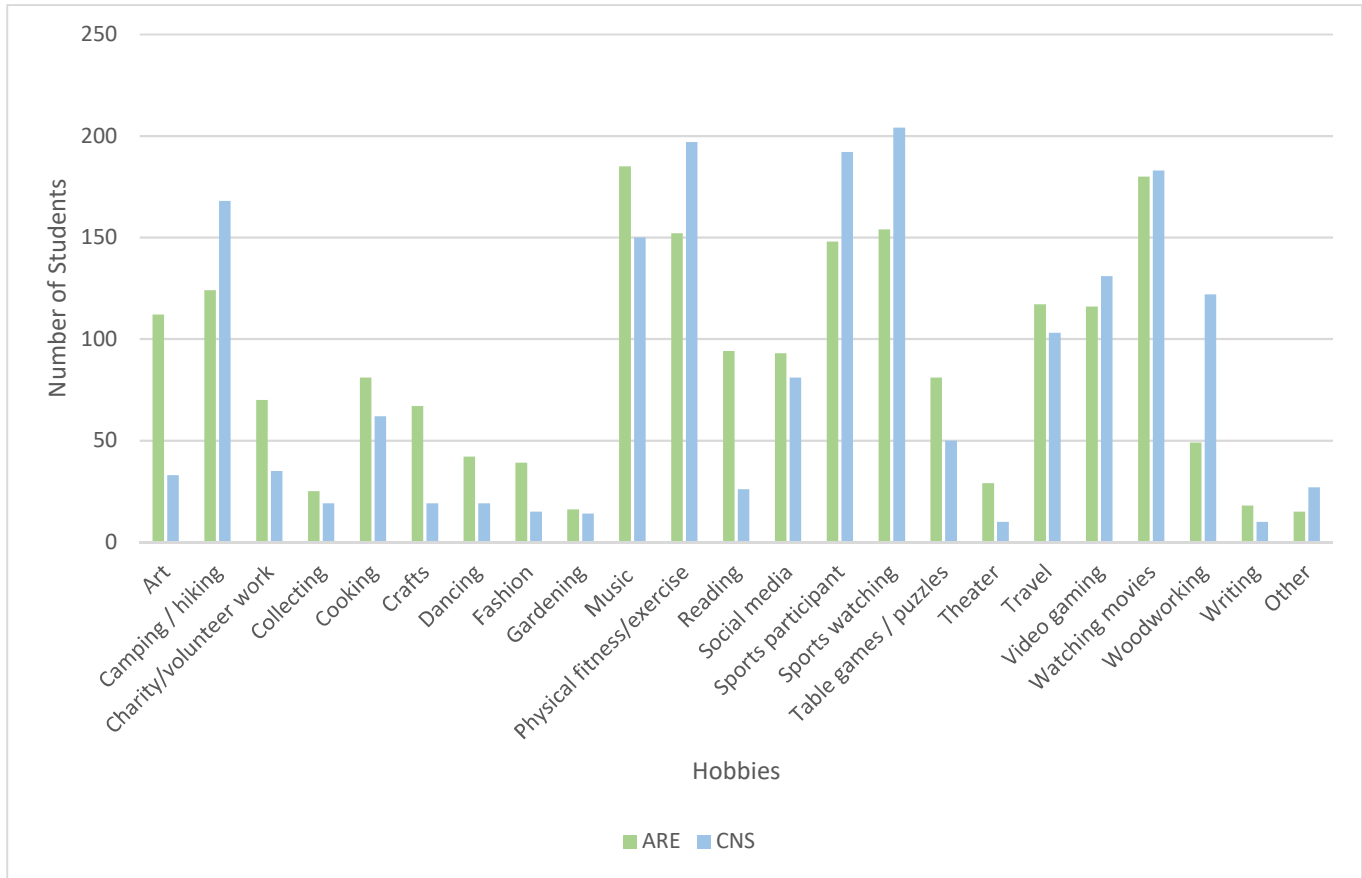

Figure 2: ARE vs CNS Hobbies

Additional spikes, more than 100 people, in hobbies for ARE were Art, Camping/Hiking, Travel, and Video Gaming. Additional spikes in CNS were Music, Travel, Video Gaming, and Woodworking. These additional spikes in hobbies are important to note because they provide additional hobbies of higher interest.

The second set of data analyzed was the comparison of hobbies between female and male students. It is important to note the discrepancy in the number of male vs female students in both majors enrolled in this course. Female students made up 32% of the ARE students sampled and 7% of the CNS students sampled. Figure 3 shows the overall percentages of the two genders within each major per semester.
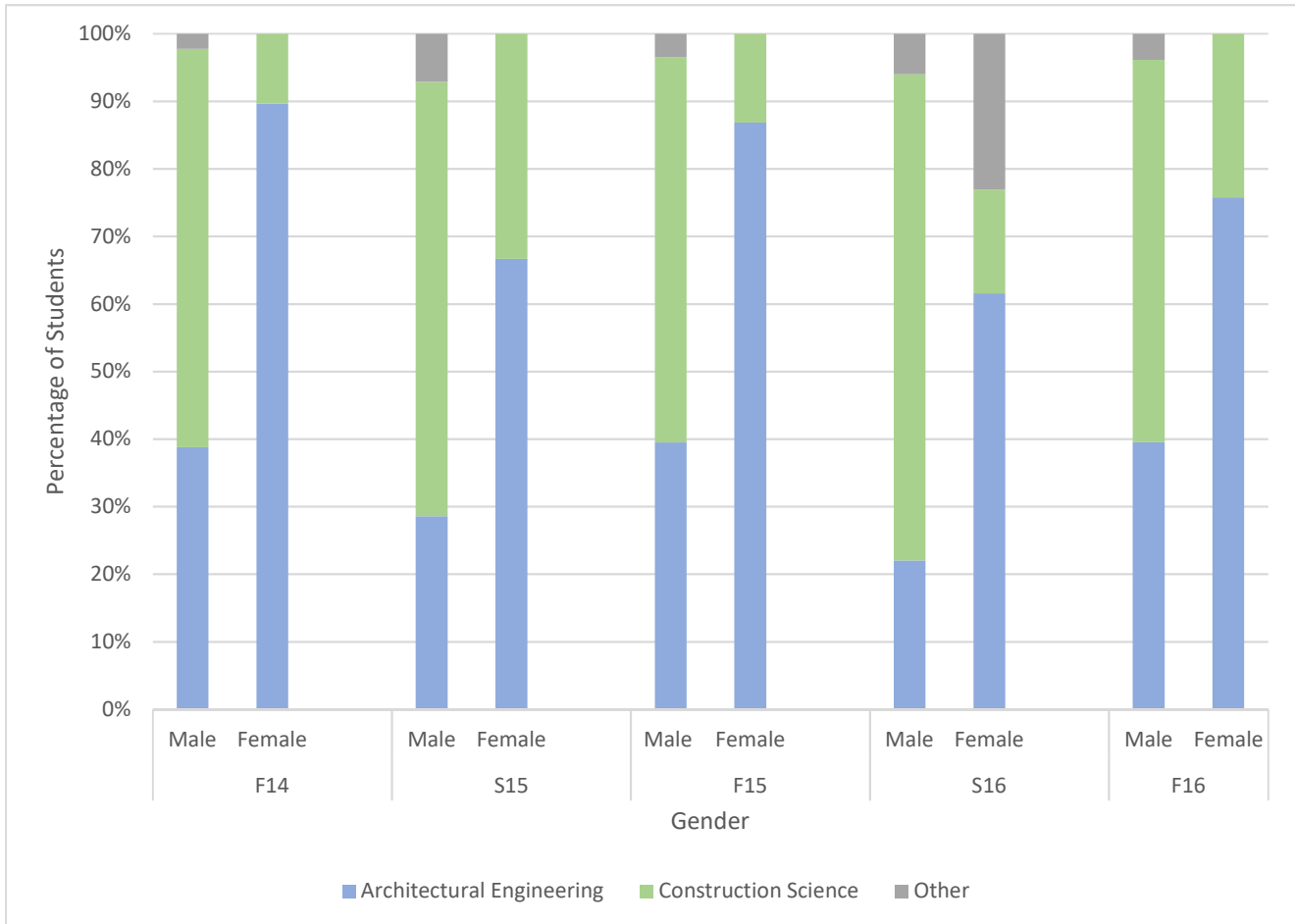

Figure 3: Male and Female Percentages per Semester in ARE/CNS

There were also distinct peaks in hobbies for female and male students. As seen in Figure 4 below, the top 5 hobbies for female students was, in order: Watching Movies, Music, Travel, Art, and Watching Sports. The top 5 hobbies for male students was, in order: Sports Watching, Sports Participant, Physical Fitness/Exercise, Watching Movies, and Music. The commonalities between the male students and the two majors was expected due to the high percentage of male students in each major.
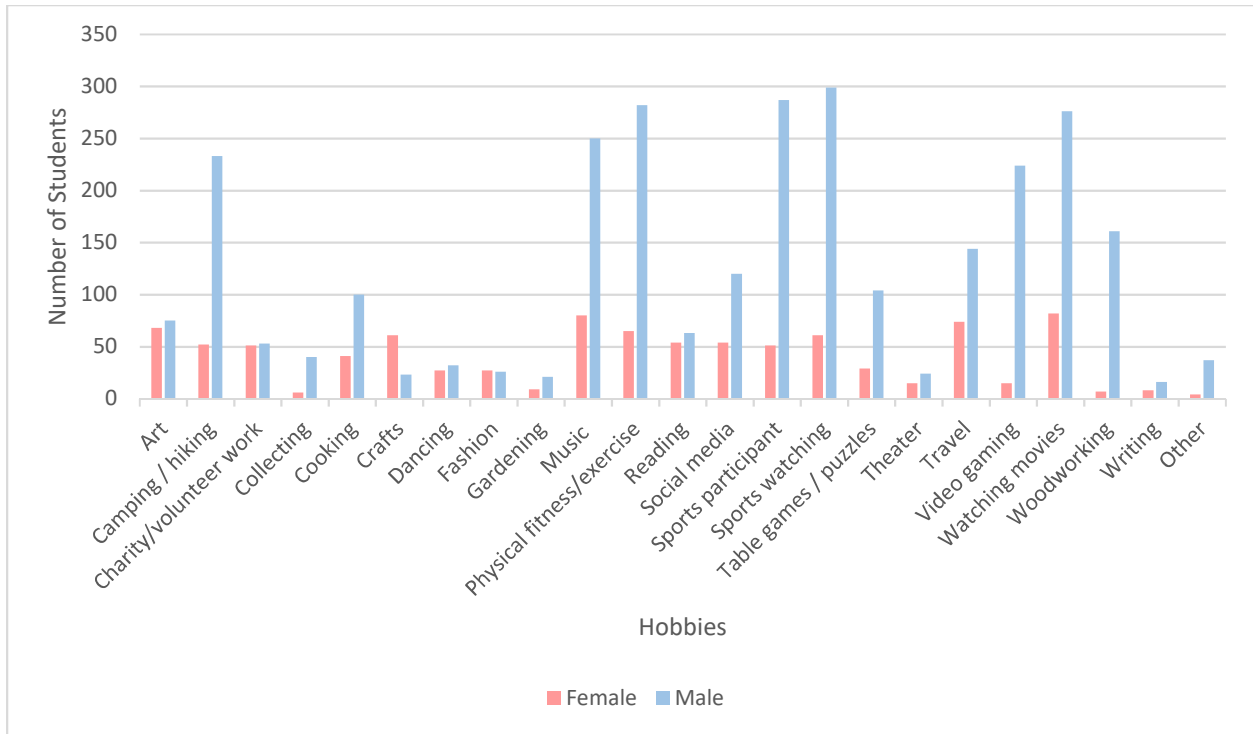
Figure 4: Female vs Male Hobbies

Additional spikes, more than 50% of female students (45 students), in female students were Camping/Hiking, Charity/Volunteer Work, Crafts, Physical Fitness/Exercise, Reading, Social Media, and Sports Participant. Additional spikes, more than 50% of male students (130 students), in male students were Camping/Hiking, Travel, Video Gaming, and Woodworking.

Conclusions, Limitations, and Applications

Two separate sets of recommendations for this ARE and CNS Department can be made as a result of the data collected. One set of recommendations specific to efforts related to existing students and the other focused on the recruitment of future students.

For existing students, the recommendations are to achieve the goal of involving students in the department both inside and outside of the classroom. The data collected in this study can be used for 3 main purposes:

1. Modification of technical presentations and seminars.
   - Topics that will most likely hold the interest of the majority of students in each major could be shared with invited presenters.
2. Align student group social events to match with more students' interests.
   - Share data with the student groups so that social events can be targeted to match the interests of underclassmen to promote involvement.

3. Include examples and exercises used in classes incorporating topics more likely to engage students.
    - Educate professors as to student interests and encourage tailoring of class examples to increase student engagement and participation.

For future students, the recommendations are to achieve the goal of tailored recruitment of students. The 3 main purposes for data related to future student recruitment:

1. Social media posts showcasing these hobbies and their relationship to these majors.
    - Allows incoming students to see that they can design sports arenas or hospitals if they become involved in the department.
    - Example: Specific announcements of students groups winning design competitions with a description of the building.
2. Modified educational and promotional pamphlets that include how the hobbies relate to each major.
    - Allows incoming students to recognize that the types of projects they would get to work on reflect their personal interests.
    - Example: Show a CNS student site surveying a sports arena or large performance arena/hall.
3. Incorporate gender recognizing there are consistent differences in preference.
    - Allows incoming students to see that a hobby they are passionate about or want to pursue is available with these majors.
    - Example: Female students' traveling across the country to different conferences with department student groups.

While this data is useful in the ARE and CNS Department at this university, the results are not necessarily transferable to other engineering programs. However, the process could easily be replicated among other universities. In addition to the information being useful to the individual institutions the results could produce future research potential if shared and analyzed between institutions.