

## **GIFTS: Retention Improvement Efforts in the Undergraduate Living and Learning Community at the University of South Carolina**

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## **GIFT: Retention Improvement Efforts in the Engineering and Computing Undergraduate Living and Learning Community at the University of South Carolina**

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The University of South Carolina Engineering and Computing Living and Learning Community (ECC) is focused on helping students succeed in their academic careers. For many years, program activities include a one-hour professional development course, linked coursework for mathematics and chemistry courses, and residence hall tutoring availability. Recent efforts include an early move-in boot camp, additional linked courses, and new spring activities.

**Boot Camp** - Math placement test results often correlate with future success in progression toward a degree. An Early Move-In Boot Camp with a focus on mathematical fundamentals was implemented. Approximately 20 students arrive four days early before campus move-in, leaving three full days available before normal move-in occurs. During this time, a mix of different activities were scheduled for the participants. Some mathematics review was conducted, with a focus on basic algebra and common algebraic mistakes. Discussion of basic calculus with multiple examples was provided. Application of mathematics in engineering was presented to help inspire and motivate students to master skills needed later in their degree progression. Rather than just focus on mathematics, a significant amount of time was spent with professional development topics. Academic success, career development, health and wellness, and other topics were presented. These topics would normally be covered in the award-winning University 101 course, but most CEC students do not take this course. Additionally, the topics may be covered later in the semester after academic damage is done. Other time was spent in hands-on activities. Scratch programming was incorporated to expose students to fundamental concepts in computer programming by creating fun simple games. Basic circuits were created using breadboards and Arduino Nanos. Short hands-on activities included a tower contest, a bridge-building contest, and a paper airplane contest. The highlight of the camp was creating and launching model rockets at the end of the camp. To ensure students were not getting in trouble during their free time, participants were expected to participate in all scheduled activities. At night, board games, video games, and movies were scheduled. Morning activities included multiple walks around campus to help students learn their way around. Student reviews were quite positive for the camp with particularly positive responses for helping find their way around campus, meeting others living in their residence hall, and hosting fun activities.

**Additional Linked Courses** - Fall has traditionally been the focus of most student retention efforts. Living and Learning communities traditionally have multiple linked courses (including University 101 sections) for students living in the same residence hall. However, the three-hour University 101 typically does not count toward the degree for CEC students. Additionally, students taking over 16 hours must pay an additional tuition fee. A one-hour section of ENCP 105 was developed to cover the basics of professional development. Coordination of the course with housing activities allows for food to be offered to the course. All 200 students in the community are invited to events but only a few will typically attend. Having a class of 20-40 students plus any of the other ECC students makes for more impact and effective use of housing activity funds. Other linked courses in the Fall have include science, math, and computer science courses. Working with the English department, a linked spring section of ENGL 102 was created so that students could benefit from a linked course in their second semester. The instructors for this course can also adjust some topics to make some reading and assignments relate to technology and engineering.

**Spring Activities** - Students often have academic difficulty in the first semester and can benefit from follow up interaction in their second semester. Realizing this, an additional course was created for spring. Rather than professional development, this course had a focus on various engineering topics as requested by the twenty enrolled students. Student questions included: How does a computer work? How does the internet work? How does 3D printing work? Along with discussions related to computer programming and circuits, one lecture focused on what technology is required to live in space / grand challenge problems. The course was offered concurrently as both 0-hour and 1-hour versions. Example assignments included using Scratch to create a simple video game and using software to make art. Food, snacks, or prizes were sometimes provided by housing to attract additional students beyond those enrolled in the course. The special events for Spring 2022 included: Introduction to TinkerCAD / 3D Printing, Scratch Game Design Competition, Breadboarding with Arduino Nano, and a Team Bridge Competition. The Scratch coding environment from MIT serves as a glue for some of the assignments in this course. Scratch block-type code is a good platform for students to be exposed to, as syntax errors are uncommon. Even though it was originally targeted for elementary school aged children, it also works well for college students that have not had any coding experience. Scratch-type code appears in other online resources. It is possible to program an Arduino microcontroller in TinkerCAD Circuits using Scratch-like block-code. TinkerCAD also allows for block-code control of the CAD environment. Additionally, MicroBit hardware from BBC also allows for block-code type programming. Student feedback was very positive, mainly due to the relaxed nature of the class. Technical topics were presented in an environment with low-academic stress, as grades were based on attendance and completion.

## Bibliography

1. Armoni, Michal, Orni Meerbaum-Salant, and Mordechai Ben-Ari. "From scratch to "real" programming." *ACM Transactions on Computing Education (TOCE)* 14.4 (2015): 1-15.
2. Eidum, Jennifer, et al. "Thriving in Residential Learning Communities." *Learning Communities: Research & Practice* 8.1 (2020): 7.
3. Inkelas, Karen Kurotsuchi, et al. *Living-learning communities that work: A research-based model for design, delivery, and assessment*. Stylus Publishing, LLC, 2018.
4. Pike, Gary R. "The effects of residential learning communities and traditional residential living arrangements on educational gains during the first year of college." *Journal of college student development* 40.3 (1999): 269.
5. Spanierman, Lisa B., et al. "Living learning communities and students' sense of community and belonging." *Journal of Student Affairs Research and Practice* 50.3 (2013): 308-325.
6. Topalli, Damla, and Nergiz Ercil Cagiltay. "Improving programming skills in engineering education through problem-based game projects with Scratch." *Computers & Education* 120 (2018): 64-74.