Teaching, Service, and Research Achievements
Michael E. Cotterell

Although I have been teaching at UGA, in some capacity, every year since Fall 2012, this evidence will focus on my major achievements in teaching, service, and research over the last five years with an emphasis on the last three years.

Teaching

Summary of Teaching Achievements. In the past three years, I have received two teaching-related grants, participated in three different teaching-related faculty fellowships, and won two departmental teaching awards in 2018 and 2020. I was also selected as a finalist for the 2019 Franklin College Excellence in Undergraduate Teaching Award and nominated for the 2020 Franklin College Excellence in Undergraduate Teaching Award.

Proposal and Development of CSCI 3030E. In 2018, I proposed an online version of the required CSCI 3030 Computing, Ethics, and Society course, which I developed, in part, with the UGA Office of Online Learning through my participation as a 2018 – 2019 Online Learning Fellows program. I taught the first offering in Summer 2019, and it was very well received. For Summer 2020, we have roughly tripled the enrollment capacity to 120 students, and the class is already full, with some students on the waitlist.

Proposal and Development of Open Educational Resources for CSCI 1302. In Spring 2019, as part of the UGA Active Learning and Affordable Course Materials initiatives, a colleague and I redesigned the CSCI 1302 Software Development course to make it a flipped, active learning course supported by instructor-authored open educational resources (OERs) and peer-based active learning. Data ascertained from CSCI 1302 students via surveys between Spring 2019 and Fall 2019 suggest that active learning gives them more confidence in their understanding of the material and lead them to ask better questions (UGA IRB ID#STUDY00006734). The same data also suggest that the instructor-authored OERs save them money, makes it easier for them to study, and reduces their anxiety. We estimate that the total cost savings for students exceeds $100,000 each year. During the Fall 2019 semester, my colleague and I participated in a Mid-Semester Formative Evaluation (MSFE) of this course that was conducted by a Specialist in Teaching and Learning from UGA's Center for Teaching and Learning (CTL). The MSFE, which is summarized in Appendix A, provided both myself and the students with a structured tool to assess the course in a friendly and constructive way, and it afforded me valuable insights that led to changes and improvements in the course.

Proposal and Development of CSCI 1300. In 2020, my proposal for a new elective course CSCI 1300 Introduction to Programming with Python was approved by the University Curriculum Committee. The first offering will be in Fall 2020 with an enrollment cap of 120. This course is designed to attract students of all backgrounds and assumes no prior programming experience. It is structured to provide an excellent opportunity for non-majors to gain programming-related data literacy skills and for potential majors who desire an exploratory segue into our introductory programming course sequence. In Spring 2020, my proposal to include CSCI 1300 under Area III Quantitative Reasoning in the General Education Core Curriculum was also approved.

Management of Teaching Assistants. Each semester, I regularly teach multiple large sections of CS classes at UGA. To make these courses more manageable, I utilize a simple hierarchical management strategy to coordinate my TAs. I select one or two graduate TAs to take on the role of Head TA(s), then I train the Head TA(s) on my requirements and expectations related to TA work for the course. While I regularly meet with all my TAs, I like to focus my attention on high-level tasks with the Head TA(s) so

that they can manage the rest of the TAs. The entire team utilizes software such as Slack and Trello to keep in communication, assign tasks, perform follow-ups, and maintain a record of the work that is being completed. It's important to me that TA work be correct, consistent, and documented; this strategy has helped make those things possible in a manageable, transparent way. Students, TAs, and co-instructors often comment on how well organized my courses are, and I attribute much of that to this style of management.

Publications, Grants, and Awards

Below is a list of my recent teaching-related publications:

1. Michael E. Cotterell, Delaram Yazdansepas, and Bradley J. Barnes. 2020. Active Learning in CS2 and Discrete Mathematics. In *Proceedings of the 51st ACM Technical Symposium on Computer Science Education* (SIGCSE '20). Extended Abstract: Poster. Association for Computing Machinery, Portland, OR, USA, 1318. isbn: 9781450367936. doi: 10. 1145/ 3328778.3372618

2. Michael E. Cotterell, Delaram Yazdansepas, and Bradley J. Barnes. 2020. Improving Student Sentiment of Active Learning in CS2 and Discrete Mathematics. In *Proceedings of the 16th ACM International Computing Education Research Conference* (ICER '20). Extended Abstract: Poster. Association for Computing Machinery, Dunedin, New Zealand (in preparation)

Grants Funded:

1. $10,800. Affordable Learning Georgia (ALG). 2019 – 2020. Michael E. Cotterell (PI), Bradley J. Barnes (Co-PI). Open & Active Course Materials for Software Development. Textbook Transformation Grant, Round Fourteen.

2. $5,000. University of Georgia (UGA). 2019. Bradley J. Barnes (PI), Michael E. Cotterell (Co-PI). Creation of interactive tutorials to replace current text in CSCI 1302 Software Development. Provost's 2019 Affordable Course Materials Grant

Grants Pending Sponsor Review:

1. $174,957. National Science Foundation (NSF). 2020 – 2021. Michael E. Cotterell (PI). CRII: III: Reducing State Anxiety in Computer Science Education with Active Open Educational Resources and Peer-based Active Learning. NSF 19-579.

Awards and Fellowships:

1. Online Learning Fellow, Office of Online Learning, UGA, 2018 – 2019
2. Writing Fellow, Center for Teaching and Learning, UGA, 2018 – 2019
3. Teaching Academy Fellow, Teaching Academy, UGA, 2019 – 2020

Service

Supervision of UGA Hacks. In my time as the faculty sponsor for UGA Hacks, the annual student-organized university hackathon has grown to a point where it is regularly attended by upwards of 500 students and receives sponsorship from major companies.

Formalizing an Undergraduate Assistant Program. In 2019, I formalized the program requirements for a number of Computer Science undergraduate courses and proposed the Computer Science Undergraduate Assistance(CSUA) program as a non-credit Experiential Learning Requirement (ELR) opportunity. That proposal was approved for Franklin College students in early Fall 2019, establishing me as the Program Director and providing a competitive avenue for some of our best and brightest undergraduate students to assist the department. CSUA was the first ELR-approved PLA program on campus. Since its approval, CSUA has helped grant ELR credit to 64 students (70 by the end of Summer 2020) and helped drastically improved the quality of many of our undergraduate courses. The supervised use of CSUA participants has helped significantly improve the turn-around time and feedback quality on graded assignments, made it feasible to manage active learning exercises in class sizes as large as 120 students, and lead to improved student efficacy.

Implementing Accreditation Assessment. My other service achievements are the result of my active participation in departmental and university committees and strong support of student groups. In 2019, I was elected to represent the Physical & Mathematical Sciences on the UGA University Council. As a member of my department's Program Review and Assessment committee, I helped streamline the process for collecting and assessing student learning outcomes in our undergraduate major courses for ABET accreditation review. As a member of the CS Instructional Action Team (IAT) for the Department and Leadership Teams for Action (DeLTA) project, I have helped rewrite student learning outcomes for some of our lower division courses in an effort to promote consistency between offerings by different instructors.

Research

Summary of Research Achievements. My long-term research goal is to integrate open science, active open educational resources, and peer-based active learning in a way that facilitates effective, low-anxiety computing education at scale. My greatest achievement toward this goal has been through an IRB-approved study of classroom interventions and sentiment in the CSCI 1302 Software Development course at UGA to effect evidence-based changes. Not only has this study positively impacted my students, some of the results have been published in the form of a peer-reviewed poster abstract for the 2020 ACM Technical Symposium on Computer Science Education (SIGCSE'2020). In 2019, I also submitted a proposal for an NSF grant that relates to observations made during the pilot of this study.

In 2019, I applied and was accepted as an affiliate member of the Scientists Engaged in Educational Research (SEER) Center in UGA's Owens Institute for Behavioral Research (OIBR). I regularly attend workshops hosted by the SEER Center, sometimes alongside my students, as a form of professional development and networking. In recent years, I have also mentored a steady stream of undergraduate and graduate students via my Directed Study and Faculty-Mentored Research as they contribute to various projects related to Computing Education and Open Science. My Spring 2020 students will present at the UGA CURO Symposium and plan to submit literature reviews to an academic conference.

Appendix A

Mid-Semester Formative Evaluation: CSCI 1302 Fall 2019. On September 30, 2019, I participated in a Mid-Semester Formative Evaluation (MSFE) within my CSCI 1302 Software Development course that was conducted by a Specialist in Teaching and Learning from UGA's Center for Teaching and Learning (CTL). This formative evaluation, some- times called a Small Group Instructional Diagnosis (SGID), provides an opportunity for instructors to gather structured feedback from their students regarding the functioning of the class and the quality of student learning. A portion of this MSFE is summarized below; a copy of the original is available upon request.

As part of this MSFE, students were asked, "What's working well in this class? What are the strengths of the class and which aspects are having a positive impact on your learning?" Students responded to this question in small groups and were asked to be as specific as possible, noting disagreement among group members where relevant. Students identified the following strengths in my teaching:

Instructor:
– [Cotterell is] really well informed and helpful with problems (4 students / 1 group)
– PLAs are good to have for a class of this size (3 students / 1 group)

Content / Material:
– Concepts build on top of each other (3 students/ 1 group)
– Class exercises are helpful, good for making sure we understand content, pertain to readings (20 students / 6 groups)
– Readings and quizzes (5 students / 1 group)
– Demos work (3 students / 1 group)
– Writing out code concepts for practice (3 students / 1 group)
– Class readings on Github and videos (3 students / 1 group)
– We like the pre-class reading and class assignments (3 students / 1 group)
– Personally writes readings himself (4 students / 1 group)
– Activities are not optional, we are forced to do the work (3 students / 1 group)
– The videos, readings, and mini lessons are very helpful (4 students / 1 group)

Instructional Deliver:
– Class exercise are very good because they force you to apply knowledge (35 students / 13 groups)
– The videos are good for learning; readings are also helpful (9 students / 4 groups)
– We like the professor making the subject matter very interesting (6 students / 2 groups)
– Lectures only given when majority of students express confusion; puts on students to understand material (4 students/ 2 groups)
– Flipped classroom works well for the class (4 students/ 2 groups)
– When we see live code, it really helps-LIVE CODE PLEASE (4 students/ 1 group)
– Non textbook based (4 students / 1 group)
– I like the flipped classroom (3 students / 1 group)
– Not a lot of lecturing, we get started right away (4 students / 1 group)
– We like the layout of the class – review at the beginning and then class exercises (4 students / 1 group)

Assessment:
– Projects are fair with a reasonable time frame (4 students / 1 group)
– Make up project is very helpful (3 students / 1 group)
– The exam was a good test of our knowledge without being unnecessarily hard (3 students / 1 group)
– In-class activities help with the written portion of tests (2 students/ 1 group)
– Tests are fair (2 students/ 1 group)
– Projects and tests are related to our exercises (3 students / 1 group)
– Quizzes 3x per week – short and frequent (4 students / 1 group)

- Quizzes force me to read and take notes well (4 students / 1 group)
- Projects (5 students / 1 group)

Students also answered questions about what they felt wasn't working well and what improvements they would like. On October 4, 2019, I met with a specialist from the CTL staff to discuss the results of the evaluation and possible further steps. Following the advice of the CTL specialist to maximize the beneficial effects of the evaluation, I did the following: (a) reflected on the information contained in the evaluation results, (b) constructed a specific set of course changes that address the recommendations in the evaluation, (c) discussed the proposed changes with the class, and (d) made the agreed upon changes. I believe that the set of changes, many of which were already in the works, made a positive impact on the students that semester and subsequent semesters. I also believe that discussing with the students my reasoning for not making certain changes was just as impactful and well-received.