C3: Creativity: Independently learn new ideas and techniques and to formulate and solve a novel problem in computer science

1) What we learned about our students' learning

We initially established our benchmark as 50% of our students will produce externally reviewed publications or posters. Over the last four years, students have not been generating such work at a rate that supports our current benchmark. Our reflections on this and on the C3 learning outcome itself lead to a rubric (established 2013) for evaluating students' performance with respect to this outcome.

Rubric for Creativity in Senior Seminar

	Unsatisfactory	*Satisfactory*	*Exemplary*
Independently learn new ideas	Most or all occasions of learning or overcoming significant obstacles require assistance from faculty or peers	Most significant obstacles are overcome independently through independent discovery and practice	Lessons learned while overcoming obstacles give rise to further discovery on related problems and/or to the articulation of connections between problems
Formulate a novel problem in computer science	Either cannot formulate a problem to be explored, or cannot distinguish novel problems from those that have been solved before	Able to distinguish novel problems from others, and able to formulate statements of the former	In addition to formulating novel problems, can identify the scope and significance of such novel problems
Solve a novel problem in computer science	Unable to implement a complete solution	Able to complete an implementation that solves the problem in a practical (even if sub-optimal) amount of time	Completes an ideal, or nearly optimal, solution to the problem, identifying places where the solution is sub-optimal and articulating the trade-offs adopted within the given solution

During the same period, department faculty approved significant changes to the CS major; these changes included the elimination of the Research requirement. As such, we are increasingly relying on the capstone course, CS195 Senior Seminar, to provide data on students' creative problem solving skills. The application of the new rubric to our senior projects over the last two years indicates: 15 of 15 students demonstrated learning new ideas independently at a *satisfactory* or better level; 9 of 15 formulated a novel problem in a satisfactory or better way; 11 of 15 students implemented solutions to their problems in a satisfactory or better manner. Overall 12 of 15 students demonstrated satisfactory or better performance in at least two of the three areas.

Primarily, this rubric will be applied to projects in CS195 Senior Seminar. However, it can also be applied to other research projects on which students participate. As a preliminary benchmark, we expect 80% of our students to perform satisfactorily or exemplary in two of the three categories. Based on the last two years, our students are meeting this benchmark.

Changes made or planned to improve student learning

None at this time.