

CEISM C Distance Calculus Program

GOSA Summary and Commentary on Implementation and Evaluation

November 2014

Overview

Through its Center for Education Integrating Science, Mathematics, and Computing (CEISM C), Georgia Tech partners with educational entities and stakeholders around the state of Georgia to encourage and enhance STEM education. The Distance Calculus Program (DCP), Race to the Top-funded effort led collaboratively by the School of Mathematics, the Office of Admissions, Georgia Tech Professional Education, and CEISM C, implements competitive-admission, college-level calculus courses for high school students. The curriculum, taught via live video conferencing, matches that of Georgia Tech's Calculus II and III courses (Math 1502 and Math 2401, respectively) and awards college credit upon successful completion.

DCP consists of two parts, a lecture and a recitation section. The graduate student-led recitation section allows students to discuss and review the lecture material. In schools with a high concentration of DCP students, the recitation section is live and in-person. For schools with fewer participants – even a lone student – the recitation section is online. Race to the Top funds enabled this online extension of the program, which ran from Fall 2011 to Spring 2014 and allowed the program to reach a total of 940 students in 16 school districts. CEISM C internally evaluated the program's effectiveness and provided the end-of-grant report to the Governor's Office of Student Achievement in fall 2014.

Evaluation Methods

CEISM C's evaluation of DCP utilized participant and alumni grades from the 2012-13 and 2013-14 school years, and survey data from the 2013-14 school year. It sought to measure the program's impact on student performance. It conducted a recurring survey of engagement, at the beginning, mid-point, and end of the school year, of the students who participated in an online recitation section. The survey measured changes in Student Satisfaction (i.e., enjoyment of classes), Involvement (i.e., active and attentive participation), and Cohesiveness (i.e., degree of cooperation and collegiality between students). That survey utilized a Likert-type scale for responses, ranging from 1 ("strongly disagree") to 4 ("strongly agree"). CEISM C administered the surveys online.

CEISM C also interviewed program coordinators for the school systems and conducted alumni surveys of program participants who enrolled at Georgia Tech (approximately 50% of program participants did so). Coordinator interviews involved a discussion of the benefits to students and schools, and the outcomes for students not accepted into DCP. The coordinator interviews occurred over the telephone or within a focus group. One portion of the alumni surveys included questions on the program's benefits, such as improvements in study habits, opportunities for college credit, and effective use of the student's senior year. That portion utilized a Likert-type scale ranging from 1 ("very poor") to 5 ("excellent"). The survey also measured alumni on their Intention to Persist in STEM (i.e., the student aspires to pursue additional education and a career in STEM). To measure Intention to Persist, CEISM C asked alumni to rate statements using a 6-point Likert-type scale, ranging from 1 ("very untrue of me") to 6 ("very true of me"). CEISM C administered the alumni surveys online.

Results

DCP students generally earned high grades in the courses. In the aggregate, students averaged a B or better (final grades ranged from 88% to 96%) during the 2012-13 and 2013-14 school years. DCP alumni also performed well in Georgia Tech math classes. Alumni enrolled during the 2012-13 and 2013-14

school years earned As and Bs 84% of the time. The report could not make meaningful grade comparisons between online recitation and group recitation students because students had different instructors with varying grading rubrics.

Eighty-five (85) alumni, 61% from the 2011-12 school year and 49% from the 2012-13 school year, responded to the program's surveys. Eight-three percent (88%) of the alumni who completed the survey rated their overall experiences as good or excellent. Ninety-six percent (96%) indicated they would recommend the program to current high school students. Eighty-eight percent (88%) agreed that DCP made more effective use of their high school senior year. Eighty (80) alumni also completed the survey gauging Intention to Persist. Most alumni reported that they intended to continue taking courses related to STEM and could see themselves working in a STEM field in the future.

Seven (7) online recitation students (out of 20) from the 2013-14 school year completed all three engagement surveys. These students showed increases in two out of three constructs – Satisfaction and Cohesiveness – at each point during the 2013-14 school year. For Involvement, the students showed an increase over the total school year from August to April, but a small drop from the mid-point survey in January to the end-of-year survey in April. The average scores for all three constructs at the school year's end indicated positive responses from students. However, the low response rate and small sample size limit the generalizability of the engagement survey findings.

CEISMC's interviews with program coordinators, who worked with multiple school districts, conducted in April and May 2014, yielded positive commentary on the program's benefits to students and the districts. Two coordinators participated, accounting for 44% of school districts (7 of 16). Coordinators reported similar benefits as students, but additionally noted an increased likelihood of students to take prerequisite math courses earlier in their high school careers (in order to qualify for DCP). Coordinators also remarked on the program's improvements to participating schools' reputations and ability to meet student needs.

GOSA Commentary

Generally, the program met expectations and provided an important postsecondary math option for high-achieving students that increased their perceptions of their preparedness for college and their interest in STEM. However, for future evaluations of program effectiveness, CEISMC should attempt to measure the postsecondary outcomes of all course completers instead of only those who enter Georgia Tech, where possible. While obtaining survey responses for students not attending Georgia Tech might be difficult, it would provide more information about the program's impact on participants' postsecondary success. Finally, CEISMC should increase the survey response rate of participants while they are in the course to strengthen its estimates of program impact.