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Impact and Pedagogical Efficacy of Supplemental Instructors in Introductory Programming Education

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Impact and Pedagogical Efficacy of Supplemental Instructors in Introductory Programming Education

TREO Talk Paper

Abstract

Learning how to solve problems using computer programming is very challenging for beginners. Supplemental instructors (SIs), student peers who lead tutoring sessions outside of normally scheduled class time can be of great assistance. This research investigates the impact and pedagogical efficacy of the presence of SIs in the classroom during the normal lecture. Specifically, this research addresses three questions: (1) What impact, if any, does the presence of the SI in the classroom have on tutoring session attendance? (2) What impact, if any, does the presence of the SI in the classroom have on grades? (3) How do the students who attend these SI-led sessions rate the impact of the sessions on the learning process as compared to students who attend other sessions?

In the fall 2019 semester, our introductory programming course was offered in two different sections: Tuesday and Thursday mornings (Section 01) and Tuesday and Thursday afternoons (Section 02). Our SIs attended the afternoon lectures (Section 02), while no tutors were present during the morning lectures (Section 01). One SI attended the Tuesday afternoon classes and the other SI attended the Thursday afternoon class. Outside of class, the same two SIs each held one open tutoring session weekly in the Wednesday and Thursday evenings, respectively, both at 5:30 pm to 8:00 pm. Both sessions were advertised and made available to all students from both sections.

To address the first research question, we collected attendance data at tutoring sessions throughout the semester. Statistical analysis results indicated that there were no significant differences in attendance of tutoring sessions between students who had an in-class tutor and those who did not. To address the second research question, we analyzed all graded materials including assignments, quizzes, and exams. We also compared students' final scores for the course. There was no appreciable difference in the scores of the two sections. To address the final research question, we collected survey data, which measured student perception of peer tutor effectiveness, at the end of the semester. We found convincing results that suggest that students were overwhelmingly satisfied with their tutors and tutoring experience and that they perceived their tutoring experience as having been beneficial to their learning outcomes. However, statistical analysis indicated that there were no significant differences in perception between students in the two sections.

Although we did not discover a significant difference between the two groups in terms of the presence of the SIs, we did find that our students were very satisfied with their interactions with the peer tutors and they perceived those interactions as very beneficial. Our counter-intuitive findings suggest that these mentors can have the same positive impact on their mentees without attending lectures along with their mentees. As stewards of the university's scarce resources and in opposition to conventional wisdom, it is valuable to know that our students may be able to enjoy the benefits that peer tutors can provide without requiring SI attendance in the classroom.