Notice of the Final Oral Examination
for the Degree of Master of Science

of

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"Towards a Data-Driven Analysis of Programming Tutorials' Telemetry to Improve the Educational Experience in Introductory Programming Courses"

Department of Computer Science

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Engineer and Computer Science Building
Room 660

Supervisory Committee:
Dr. Yvonne Coady, Department of Computer Science, University of Victoria (Supervisor)
Dr. Melanie Tory, Department of Computer Science, UVic (Member)

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Abstract

Retention in Computer Science (CS) undergraduate education, particularly of underrepresented groups, continues to be a growing challenge. A theme shared by much of the research literature into why this is so is one of a distancing in the relationship between CS professors and students [39, 40, 45]. How then, can we begin to lessen that distance, and build stronger connections between these groups in an era of growing class sizes and technology replacing human interaction? This work presents BitFit, an online programming practice and learning tool, to describe an approach to using the telemetry made possible from deploying this or similar tools in introductory programming courses to improve the quality of instruction, and the students' course experiences. BitFit gathers interaction data as students use the tool to actively engage with course material.

This thesis first explores what kind of quantitative data can be used to help professors gain insights into how students might be faring in their courses, moving the method of instruction towards a data and student-driven model. Secondly, we demonstrate the capacity of the telemetry to aid professors in more precisely identifying students at-risk of failure in their courses. Our goal is to reveal possible reasons these students would be considered at-risk at an early enough point in the course to make interventions possible. Finally, we show how the use of tools such as BitFit within introductory programming courses could positively impact the student experience. Through a preliminary qualitative assessment, we seek to address an impact on confidence, metacognition, and the ability for an individual to envision success in CS. When used together within an all-encompassing approach aimed at improving retention in CS, tools such as BitFit can move towards improving the quality of instruction and the students' experience by helping to build stronger connections rooted in empathy between professors and students.