

CS2 and the Impact of Programming Language Choice

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ABSTRACT

There has been extensive research about the CS1 course. Much less has been written about the CS2 course, which is often a gateway course for CS majors. CS2 classes often reflect a second semester course in programming, yet when studying this course many universities have different purposes for this course. This poster shows the programming languages used in CS2 courses by the CS programs on the 28th Reid List of First Programming Languages. The languages used in CS1 and CS2 courses are discussed and the transitions between languages as students progress from their first course to their second. The analysis will then be discussed.

CCS CONCEPTS

- **Social and professional topics** → CS1

KEYWORDS

Introductory programming, programming languages, CS1, CS2

1 INTRODUCTION / PROBLEM

When studying introductory programming pedagogy, most works concentrated on CS0 or CS1 classes. However, with varying curricular paradigms being adopted to ensure students can purposefully program in multiple languages, many schools have now moved to having multiple languages in a CS0–CS1–CS2 arch. The impacts of the implementation of CS2 is not well studied. Using the Reid List as a model, we surveyed Reid List members and discovered the languages they are using in CS2. Currently, there is a wide range of variation in CS courses. They may be used to expose students to a wider range of languages; in other cases, the new language is used to introduce concepts such as object oriented programming or larger-scale projects, instead of in the CS1 language. Many recognize CS2 as an attrition point for CS Majors. However, there is very little research about the exact reasons why we see the attrition behaviors that happen at the CS2 level. Understanding the impacts of the programming language and by extend the CS 2 curriculum could give insights into the attrition behaviors.

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2 BACKGROUND / RELATED WORK

Hertz (2010) performed a study to find consensus in CS2 and found that this course could be widely divergent depending upon institution. Along with Hertz, Davies et. al. surveyed 371 CS programs in 2011. Java was the most common choice in both CS1 and CS2 by far with C++ the only alternative language used to any extent. Most schools used the same language in both. Almost all schools used OOP approach in CS2 and 65% use OOP approach in CS1 as well. This work builds on our previous work in updating the Reid Lists (2011, 2015, 2019) to better understand the programming language adoption landscape.

3 OVERVIEW / RESULTS

Roughly 400 colleges and universities survey appeared on the 27th Reid List. The requirements for the AS or BS program in CS were studied to determine the first required programming course; if the school offered only a BA program, the requirements for the BA were used. If the school did not have a CS program, the requirements for the Information Systems program were used. The instructional language for the CS1 course was obtained from the course title, current syllabus or from the adopted textbook. If these sources did not provide the programming language in use, then members of the department were contacted. Faculty verification was used for 332 of the schools.

4 CONTRIBUTIONS AND FUTURE WORK

This work is part of a larger work to understand the arc of first programming language introduction in higher education. In this work, extensive data has been collected about CS1 and CS2 instructional languages. Further analysis will show how different programs handle the transition from CS1 to CS2.

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