# CoDiS Lab

**ISDS**

Master Theses

## Advancing sCool: Game Type Research and Development
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The proposed project, sCool, is an adaptive game-based learning experience designed for STEM education. In this work, we present a new iteration of sCool in efforts to further examine contributing factors of engagement, usability, and comprehension. The newly developed game experience for acquiring object-oriented programming skills is divided into two parts: concept learning and practical challenge. The concept learning part teaches students theoretical lessons of programming through fun gameplay. The practical challenge part allows students to practice programming by completing tasks. This project presents several new game types for both the concept learning and practical challenge parts. The development of these game types spreads across two phases. The first phase introduces two new game types and focuses on extending sCool to support learning object-oriented programming and improve student's learning comprehension. The second phase builds off of the first phase, introducing another new game type to improve the object-oriented programming learning experience and the game's overall usability and engagement. During the first phase, three experiments were conducted in a classroom setting with a computer science teacher. Conducting a study involving a total of 39 school students and three teachers, we are able to successfully display an enhanced understanding of different programming concepts. During the second phase, a single experiment was held remotely among a wide group of people, and the participants were self-guided by an instruction document and the sCool application. Conducting a study with 25 participants, we are able to show a significant improvement in the game's usability and engagement. For future works, further evaluations in-classroom and over a longer course will be useful in assessing the new game type's effectiveness in teaching object-oriented programming. Furthermore, the game should be expanded to support learning more complex concepts in object-oriented programming.