



Pearson

Revel for *Introduction to Java Programming*

Product Efficacy Report Summary



Programming and coding skills are in high demand, and can provide access to employment in growing fields. But a high percentage of undergraduates who enroll in relevant programs do not persist until they achieve competency in the subject and employment in the field. Revel for *Introduction to Java Programming* aims to give students an authentically challenging experience of Java programming and is designed to support them to persist with more and more challenging tasks based on learning science principles.

What is the impact on outcomes?

Impact Evaluation Study 1

Because knowledge of the Java programming language is a prerequisite for many software development roles, Pearson sought to explore how the use of Revel for *Introduction to Java Programming* by Y. Daniel Liang is related to learner outcomes related to achievement on assigned tasks, tests, and the course as a whole.

To explore this potential relationship between the use of Revel and its intended outcomes, Pearson conducted a study with:

- 114 students**
- taking an introductory computer science course**
- between the Spring 2018 and Fall 2019 semesters**
- at the University of North Carolina at Greensboro (UNCG)**

How Revel was used

In each week of the course, students had one lecture and one lab where students worked to complete a programming assignment under real-world conditions. On Fridays, students were assigned a section of the Revel text, including end-of-section programming tasks, to complete before the lecture on Tuesday.

Course structure

Monday	Tuesday	Wednesday	Thursday	Friday
				Revel reading content & end-of-section programming tasks released for Topic X
Revel reading content & end-of-section programming tasks for Topic X due before lecture	Formal lecture for Topic X content and end-of-section programming tasks	Revel end-of-chapter programming tasks for Topic X due morning of programming lab	Students complete instructor-created programming lab assignment	Revel reading content & end-of-section programming tasks released for Topic Y
	Revel end-of-chapter programming tasks released for Topic X			

“I do enjoy them [the practice tasks], because it shows me how or what I’m expected to do in a lab, basically. And it helps me get examples of other ways to use this certain concept.”

UNCG student

Students were allowed to attempt these programming tasks unlimited times without penalties. Programming tasks in Revel for *Introduction to Java Programming* contributed 10% of students' overall course grades.

What we learned

To answer questions about relationships between performance on Revel tasks and performance in the course, we used statistical models to connect students' usage of Revel for *Introduction to Java Programming*, and their performance within it, to summative measures of achievement collected outside Revel.

Our analysis suggests that students tended to persist with programming tasks in Revel, despite these tasks authentically mimicking the challenges a professional programmer might face in a competitive workplace.

- On average, students earned just one third of the total possible points on their first attempts on the programming tasks, showing how challenging they can be.
- The instructor noted that most errors on early attempts are the result of simple typos or accidental omissions, rather than a lack of knowledge, skills, or ability.
- Persistence after initial errors tended to pay off in the form of higher scores.

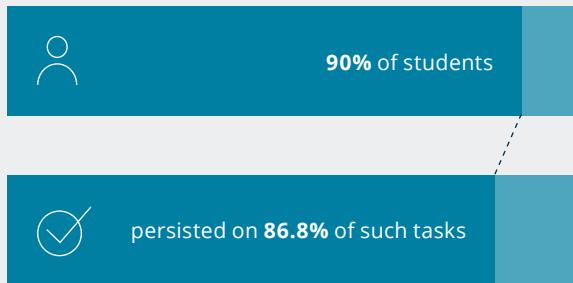
The study also suggests that students' performance in Revel for *Introduction to Java Programming* is related to their performance in other parts of the course.

- Students who scored higher on their first attempts at Revel programming tasks also tended to do better on the programming tests constructed by the course instructor.
- And students who initially got Revel programming tasks incorrect, but persisted until they earned higher scores, also tended to receive higher final course grades.

In the context of a study conducted with 114 students between the Spring 2018 and Fall 2019 semesters at UNCG, we can make the following descriptive statement about the efficacy of Revel for *Introduction to Java Programming* by Y. Daniel Liang.

Descriptive efficacy statements

90% of students persisted on more than 85% of the tasks on which they initially had an incorrect first attempt



Results from the statistical models also suggest that students' persistence with challenging programming tasks tends to pay off in the form of higher test scores; and that students whose persistence leads to gains in performance also tend to achieve higher course grades.

We compared the content, assignments, and course settings of 321 courses using the same Revel title to teach nearly 7,500 students and found this course to be highly representative of introductory Java programming courses, sharing a profile with 220 (roughly 70%) of them. This suggests that the findings could potentially be replicated in a significant number of other settings.

In the same context, we can make the following correlational statements.

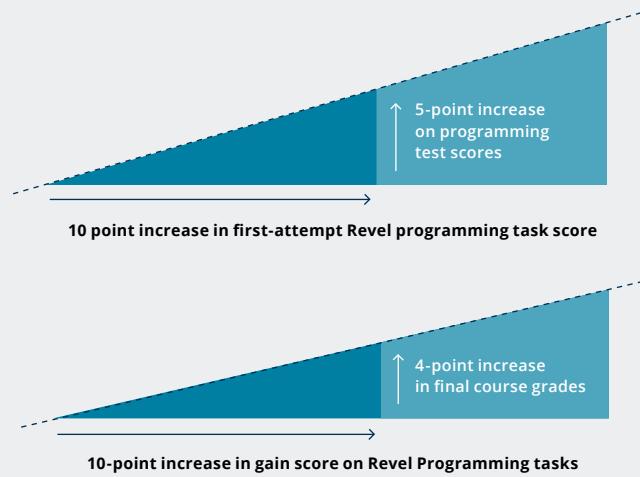
Correlational efficacy statements

Higher first-attempt scores on Revel programming tasks are associated with higher programming test scores

- A 10-point increase in the student's first-attempt Revel programming task score is associated with nearly a 5-point increase on their programming test scores

In general, students who persisted and made higher gains on Revel programming tasks from their first attempt score to their highest score tended to earn higher final course grades

- A 10-point increase in the student's gain score on Revel Programming tasks is associated with nearly a 4-point increase in final course grades



The findings from this study informed an improvement to Revel for *Introduction to Java Programming*. Originally, Revel's default settings were to allow students three attempts at each programming task, with the points awarded diminishing with each unsuccessful attempt. Influenced in part by the study's findings about challenge and persistence, this will be changed to allow unlimited attempts without point deduction for incorrect attempts.

How we did the research

The study analyzed:

- students' performance, persistence, and gains on Revel programming tasks (using data from Revel for *Introduction to Java Programming*)
- students' achievement (using data provided by UNCG)

It also explored implementation — that is, how Revel for *Introduction to Java Programming* was integrated into the course experience.

Leveraging data from a student intake survey, UNCG records, and Revel platform data, multiple regression models were employed to examine the relationships between Revel usage and persistence and competency.

Pearson's efficacy commitment

Efficacy is core to all we do. Our commitment to improving learner outcomes means that the products and services we provide to learners around the world are designed to help them make measurable progress in their lives through learning. In practice, this involves identifying the outcomes that matter most to learners and educators, and then designing products based on evidence from learning science about what will help realize those outcomes. We iteratively explore the impact that the use of our products has on learning and apply these insights to continuously improve our products and services.

Explore the full report at pearson.com/news-and-research/efficacy.html