

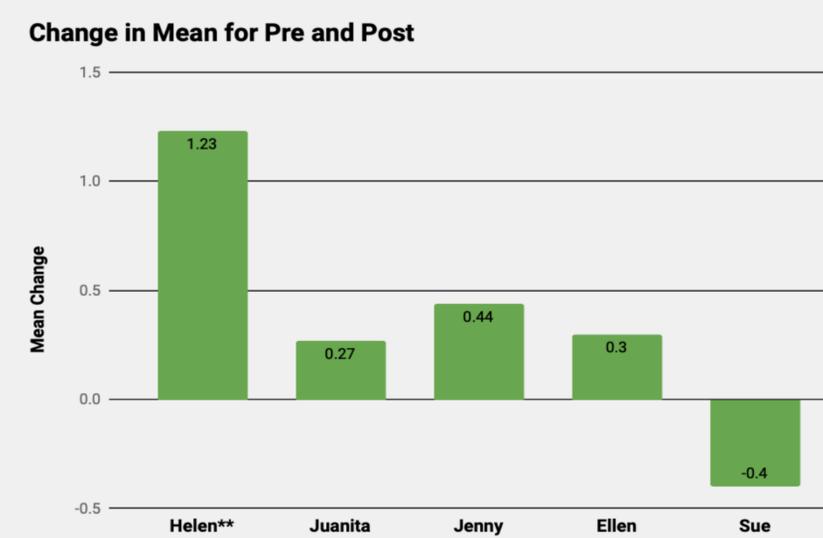
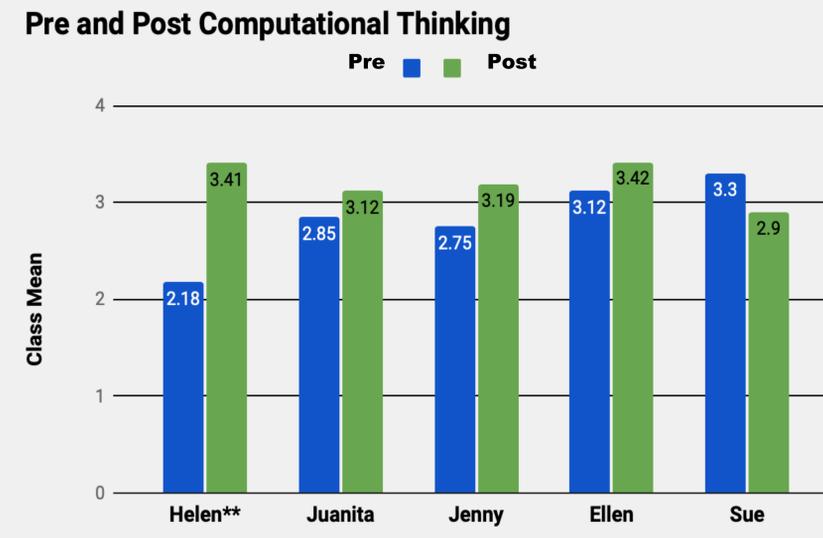
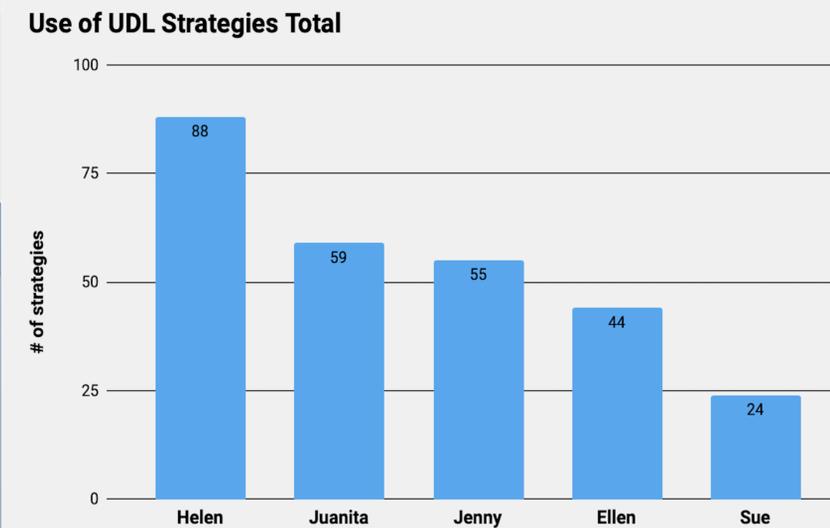
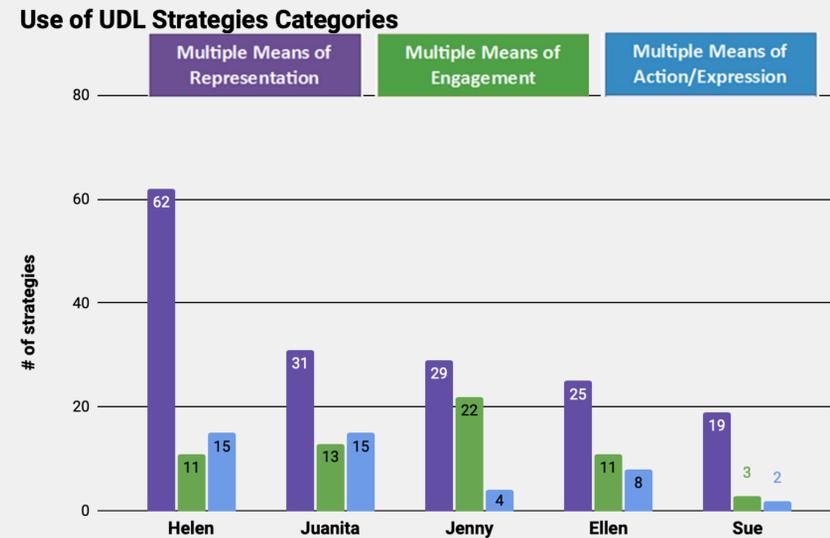
Use of UDL Strategies to Teach Computational Thinking in Elementary School

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1. Introduction

- President Obama's Computer Science for All initiative set aside four billion dollars to teach computational thinking.
- Universal Design for Learning (UDL) is "an instructional planning and delivery framework intended to increase meaningful access" (Israel, 2019).
- This study investigates the way UDL strategies are used to teach computational thinking and how they relate to improve CT outcomes.

Multiple Means of Representation	Multiple Means of Engagement	Multiple Means of Action/Expression
Present information and content in a variety of ways to support understanding by students with different learning styles/abilities.	Stimulate motivation and sustained enthusiasm for learning by promoting various ways of engaging with material.	Offer options for students to demonstrate their learning in various ways (e.g. allow choice of assessment type).
		



3. Results

- All teachers observed use UDL strategies, especially multiple means of representation.
- Use of UDL strategies vary substantially from teacher to teacher.
- The teacher that used the most UDL strategies also had the greatest change in mean from pre to post test of computational thinking.

Example of multiple means of expression and engagement.

T: Leave your chrome books on the desk. Let's have a collaborative conversation.

S1: I like how the sprite had different movements. S2: I like the way her dancers moved at the same time.

S3: That was parallelism when sprites move at the same time.

2. Methods

- Five elementary school teachers were selected randomly from a group of eight.
- Two classroom observations for each teacher included detailed notes and audio.
- Coded and quantified the use of UDL strategies for each teacher.
- Pre and post computational thinking data from a student assessment for each class.
- A paired t-test to analyze statistical significance in change of students' computational thinking scores.



(Santa Ana Unified School District, 2018)

4. Limitations & Future Directions

- Two class sessions are small windows into an entire class.
- UDL strategies are embedded and are not always explicit.
- UDL strategies alone are not responsible for the increase or decrease of computational thinking.
- Future research can focus on how specific UDL strategies can be best leveraged to teach computational thinking.

Acknowledgements

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