

Data Visualization: Assignment 3

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Storyboard

Our goal in this interactive visualization was to support our own exploration of how six important behavioral factors correlate with learning gains. Rather than simply visualizing these relationships across all students, we wanted to allow the user to select a subset of students based on their performance on individual test items. This interactivity would allow us to better understand how student behavior is correlated with test performance and learning gains. We also wanted to break students down based on the version of the test that they took to see if there were any imbalances, and we wanted to compare students by experimental condition. Since this was a large number of factors and variables to view in a single visualization, we knew that interaction would be key.

The six factors we chose to visualize are: Number of Exercise Problems Completed, Number of Assessment Problems Completed, Percentage of Assessment Problems Correct, Percentage of Observations On Task, Percentage of Observations Off Task, Percentage of Observations Idle or ?. We chose display the correlations between these six factors and learning gains using small multiples scatterplots, similar to what Nell did in Assignment 2. To show differences based on condition, we chose to split the scatterplots rows. The upper row shows six scatterplots for students in the Tablet condition, and the lower row shows the same plots for students in the Paper condition.

Below the scatterplots, we visualize student performance on individual test items using a stacked bar chart. For each item there are two bars; one shows performance of students who took the A version of the test, and the other shows performance of those who took the B version. Only one test can be viewed at a time, but we added buttons to the side of the charts that allow the user to choose which test they would like to view. There are four test options: Unit 2 Pre Test, Unit 2 Post Test, Unit 4 Pre Test and Unit 4 Post Test. Clicking on one of these buttons refreshes the scatterplots and loads the appropriate problem correctness percentage bars for that test.

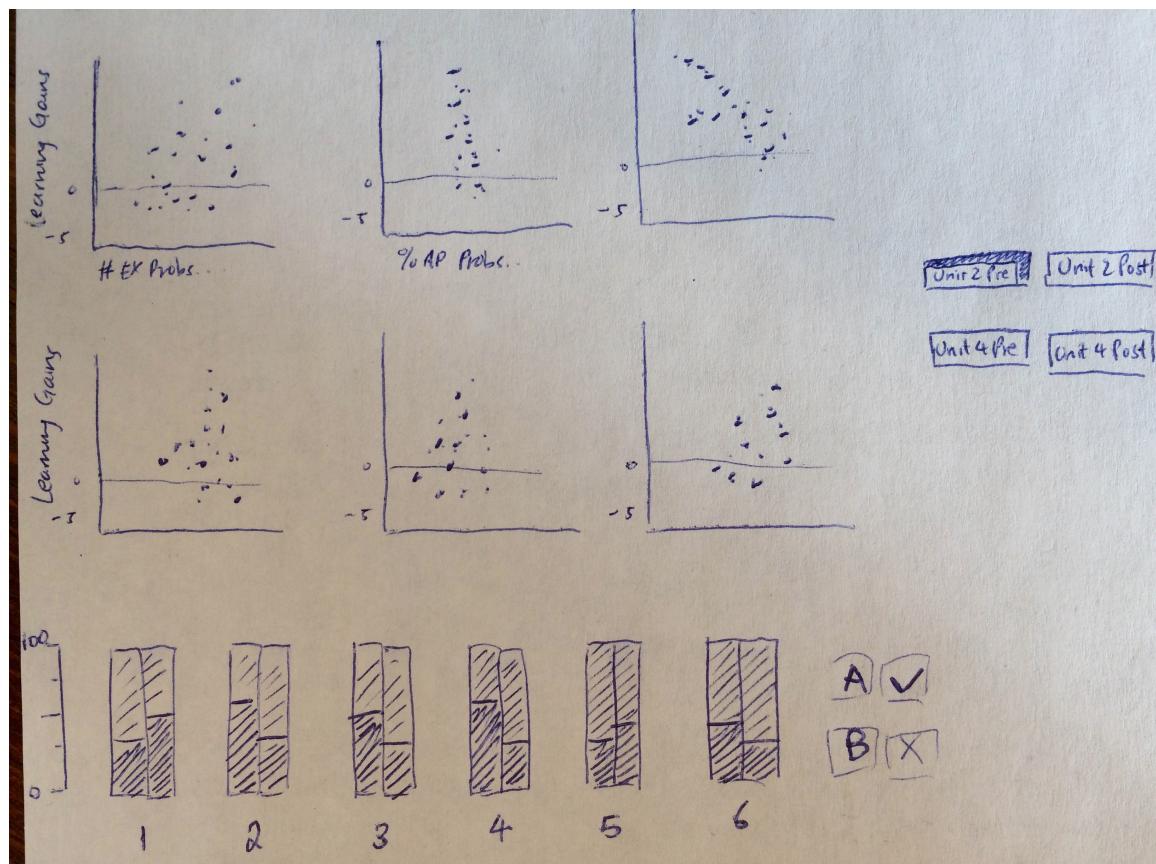


Figure 1: Our original storyboard design. Scatterplots showing the correlations between learning gains and our six factors are show at the top, divided into two rows: one for the Tablet condition and the other for the Paper condition. The stacked bar charts at the bottom show student performance on the currently selected test, broken down by item and test version (A or B). The user can select a new test using buttons at the side.

To allow the user to filter students, we made the bars clickable. The user can click on an individual bar to add filters. When a bar is selected, the students who are represented by that bar (for instance who took test A got problem 3.C correct) are selected. In the scatterplots, the dots that represent students that are not members of the selection are faded to gray, while those that are in the selection retain their original coloring. This allows the user to see whether students who had similar performance on particular test items also had similar behavior (measured by our six factors) and learning gains.

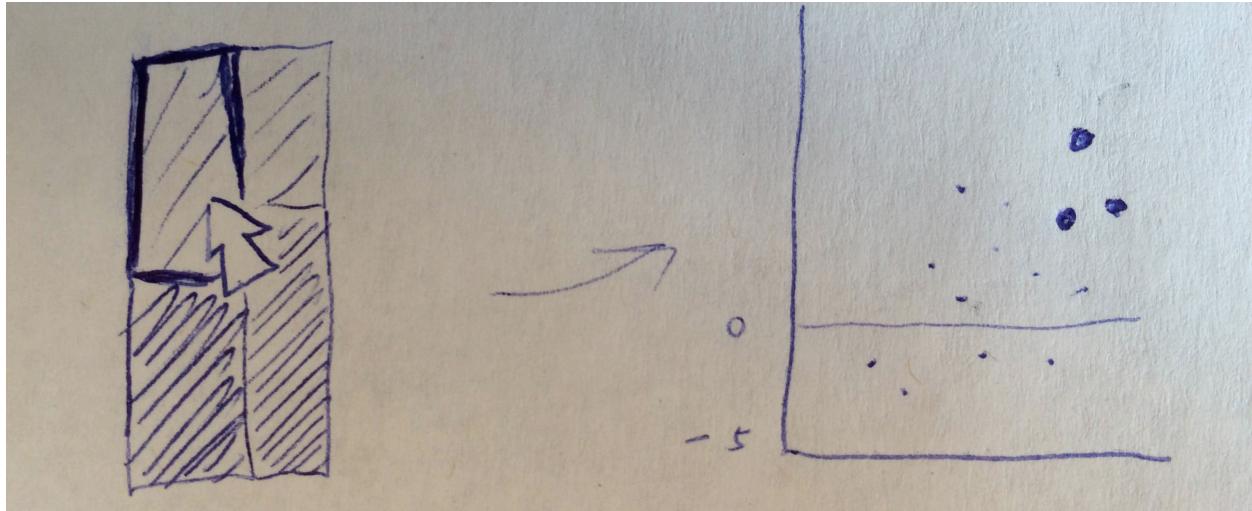


Figure 2: Bar chart interaction. The user will click on the area of one of the bars, and the scatterplots will gray-out the dots for students who are not represented by the selected bar.