A weak acid is more dilute than a strong acid.

We observed a question-order effect only on the post survey for the population of students who took high efforts in filling out the concept inventory.

Table 1. Percentage of correct answers to the pictorial and verbal questions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Test Version</th>
<th>Significance</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
<td>PV p value</td>
<td>0.267</td>
<td>0.02</td>
</tr>
<tr>
<td>Question 2</td>
<td>PV p value</td>
<td>0.333</td>
<td>0.08</td>
</tr>
<tr>
<td>Question 3</td>
<td>PV p value</td>
<td>0.715</td>
<td>0.02</td>
</tr>
</tbody>
</table>

The western institution found only significance with question P1 in both of their post populations. All other results were insignificant.


differences in participants’ demographic between the two institutions led us to conduct further investigations:

- We separated each of the populations by male and female and found no question-order effect.
- We also divided students based on their performance on the first 8 questions (students who scored a 0-4 or 5-8 out of 8). No significance was observed for either group in both data sets.

Discussion/Conclusion

- The Concept Inventory data demonstrates that a question-order effect does not exist among any of the populations.

Future Work

- We will analyze students’ misunderstanding in this inventory through item analysis.
- We will also explore how answer choices evolve from pre to post and across expertise level.

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References


discussion of the results, we hope to see the majority of GCI students to see the verbal question first:

• The majority of GCI students preferred to see the verbal question first: “Yeah because [V] was kind of like a definition almost and that kind of thing and [the diagram] was kind of more applied so it built off of it... [having V first] made me more sure of my answers.”

• The majority of OCI students had no preference: “…they kind of work in a package where like no matter which order you put them in they all kind of influence the other one the ones that follow...”

• The majority of GCI students indicated using the isomorphic question located earlier in the test:

• OCI students were equally split between using and not using the isomorphic question located earlier in the test.