

ChemSims: Anything but basic- using screencasts to support student understanding of acids

MICHIGAN STATE
UNIVERSITY

Shanna Hilborn¹, Lizzy Sielaff², Ryan Sweeder¹, Deborah Herrington²

1. Lyman Briggs College, Michigan State University 2. Grand Valley State University



Background Literature

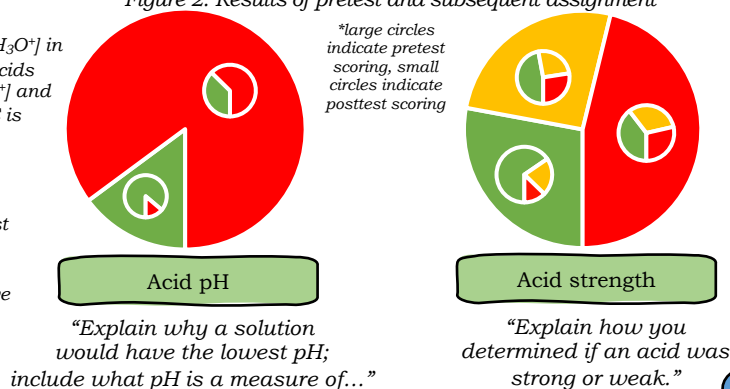
- Common issues:
 - Conflation of acid strength and concentration¹
 - pH measures acid strength not H_3O^+ concentration²
- Shorter learning modules increase retention³

ChemSims Findings

- Enhanced screencasts can explicitly address conceptual challenges⁴
- Screencasts help lower cognitive demand⁵ and focus attention on key areas⁶

- Correct
"pH is a measure of $[H_3O^+]$ in solution, and strong acids have the highest $[H_3O^+]$ and $[A^-]$ therefore beaker C is going to have the lowest pH."
- Incorrect
"Because it is the most concentrated and strongest acid so therefore it would have the lowest pH."

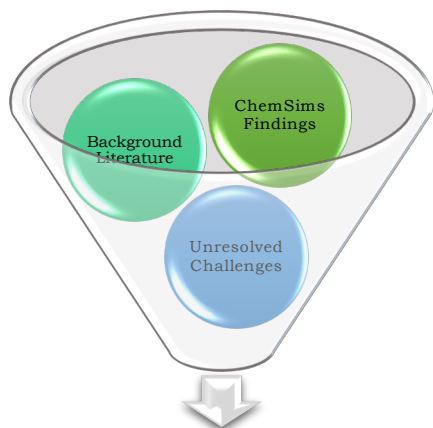
Figure 2: Results of pretest and subsequent assignment



- Correct
"an acid was strong if the acid completely dissociated ... an acid was weak if it hadn't completely dissociated."
- Mostly correct
"... by comparing the amount of unreacted acids as well as the amount of H_3O^+ and A^- ."
- Incorrect
"based on the number of molecule in every solution."

Figure 1: Previous edition of screencast

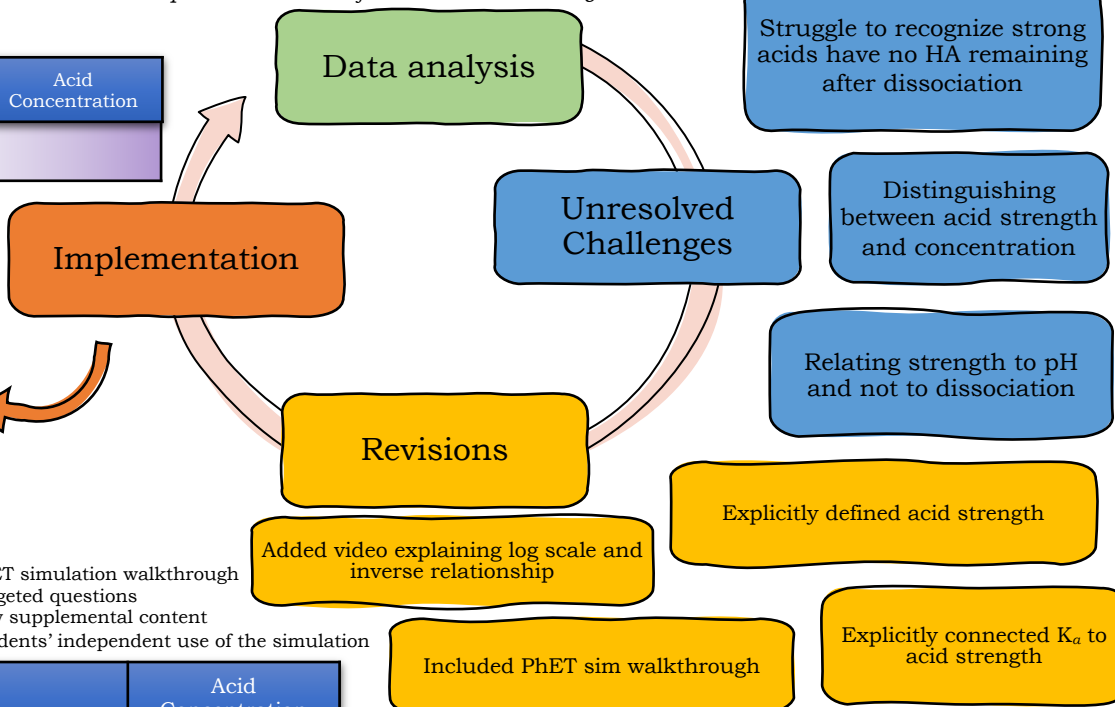
Acid Strength		pH		Acid Concentration
Strong v. Weak Acids	Questions	Exploring pH	Questions	



- PhET simulation walkthrough
- Targeted questions
- New supplemental content
- Students' independent use of the simulation

Figure 3: New and improved edition of screencast

Acid Strength						pH			Acid Concentration		
Dissociation of Acids in Water	Questions	Strong v. Weak Acids	Questions	Equilibrium Arrows	Questions	Relative Acid Strength	Questions	K and K_a	Questions	Defining pH: Logarithmic scale and Inverse Relationship	Questions



References

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