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

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Background Literature

- Common issues:
  - Conflation of acid strength and concentration[1]
  - pH measures acid strength not H_3O^+ concentration[2]
- Shorter learning modules increase retention[3]

ChemSims Findings

- Enhanced screencasts can explicitly address conceptual challenges[4]
- Screencasts help lower cognitive demand[5] and focus attention on key areas[6]

Figure 2: Results of pretest and subsequent assignment

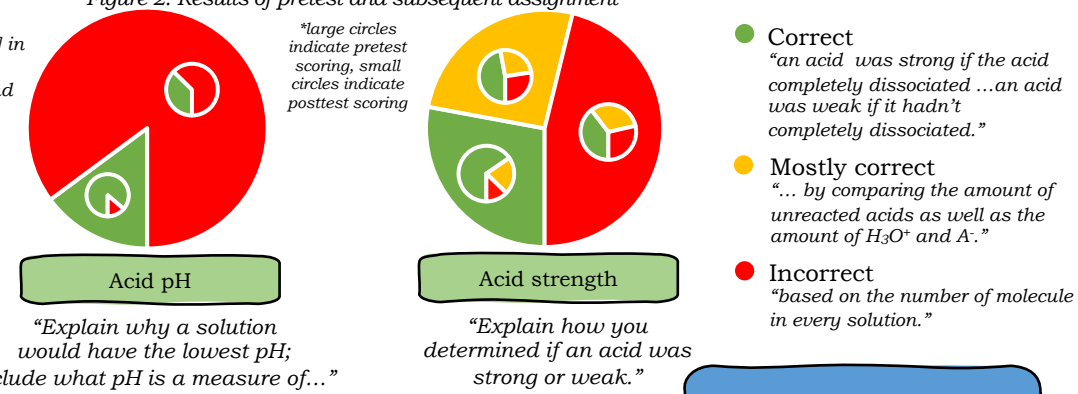
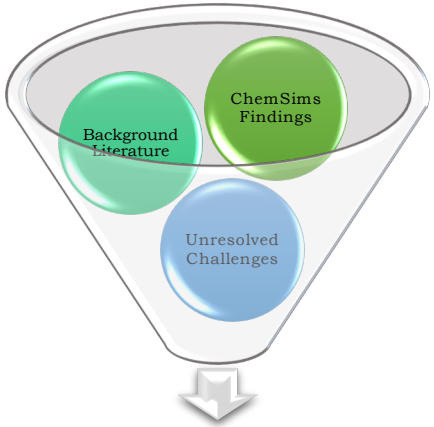


Figure 1: Previous edition of screencast

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



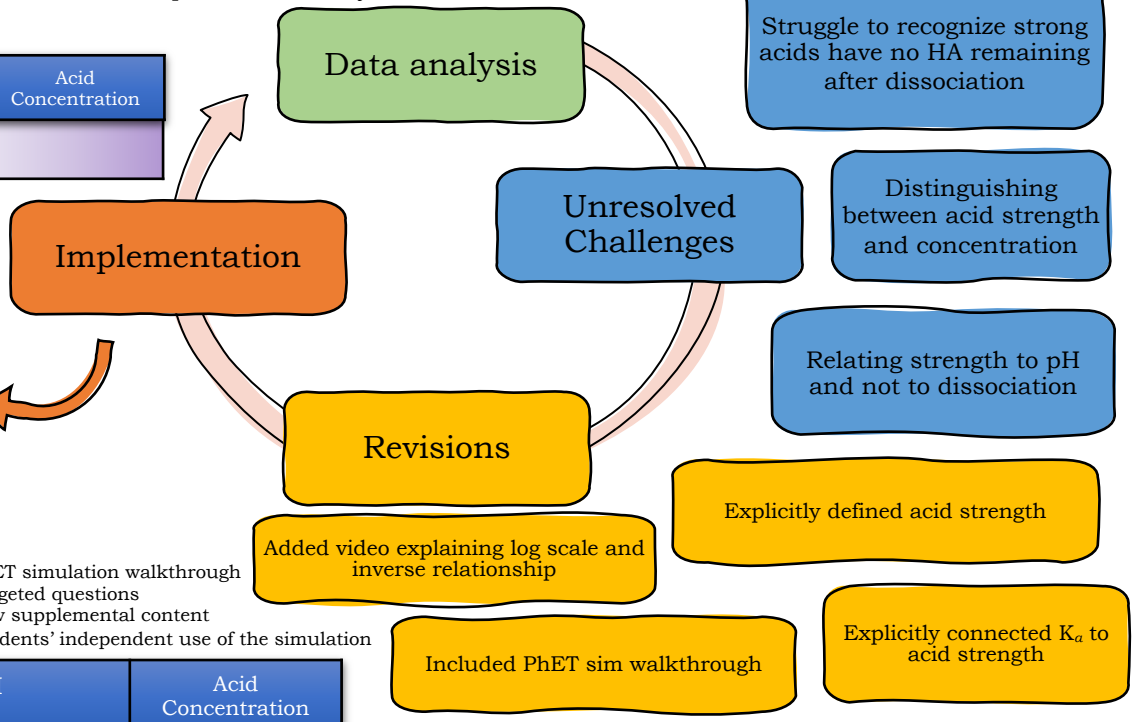


Figure 3: New and improved edition of screencast

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

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	

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1. Jasien, P. G. (2011). What Do You Mean That "Strong" Doesn't Mean "Powerful"?
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5. Jessica R. VandenPlas, Deborah G. Herrington, Alec D. Shrode, and Ryan D. Sweeder. Use of Simulations and Screencasts to Increase Student Understanding of Energy Concepts in Bonding", *Journal of Chemical Education* (2021)
6. Ryan D. Sweeder, Deborah G. Herrington, Jessica R. VandenPlas "Students' Independent Use of Screencasts and Simulations to Construct Understanding of Kinetics", *Chem Ed. Res. Pract.* (2019)
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Funding IUSE Grant Nos. 1705365 & 1702592