Improving Student Interaction with Screencasts and Simulations

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Engineering Excellence Fund
Shell

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How is a screencast better than a live lecture?

Students watch on their schedule (24/7)

Students control pace: start/stop/replay

Just-in-time use

Short, modular

Students like them

Increase student confidence

How are screencasts worse than presenting in class?

“Students can’t ask questions”

“Instructor can’t see if students are getting it”

“Students will not attend class”

Students learn by practice and feedback, NOT by someone telling them what to learn

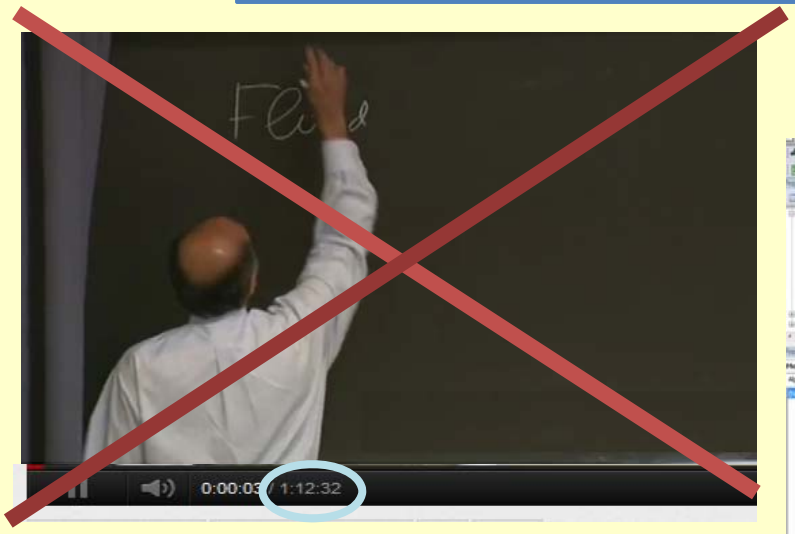
Survey 440 students about screencasts

95%: useful or very useful

85%: better than textbook at improving understanding

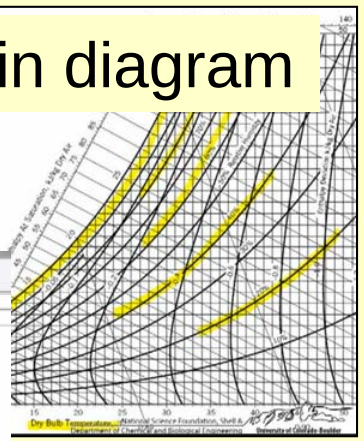
92%: felt more confident about material

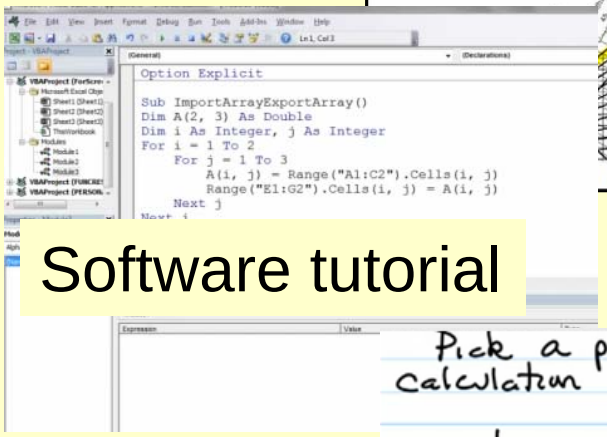
What is a screencast?



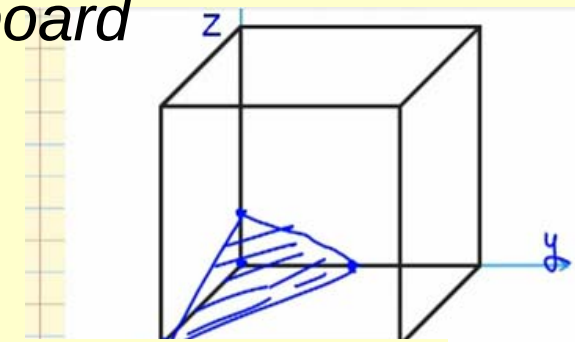
Video of person & board
50 minutes +
Multiple topics

Explain diagram

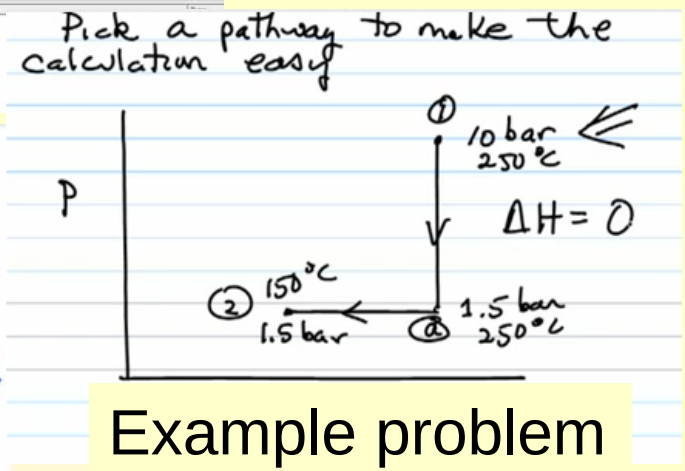




Software tutorial



Introduce topic

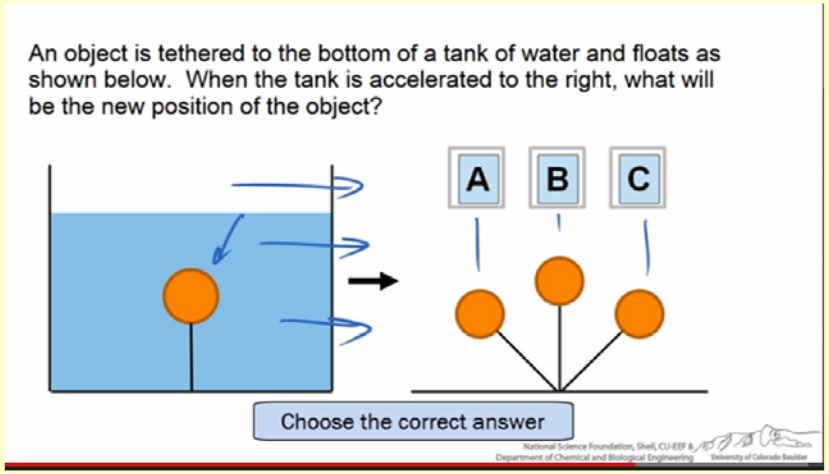


Example problem

Tablet PC screen capture; 3 -10 minutes
One topic; Camtasia

What is an interactive screencast?

Question

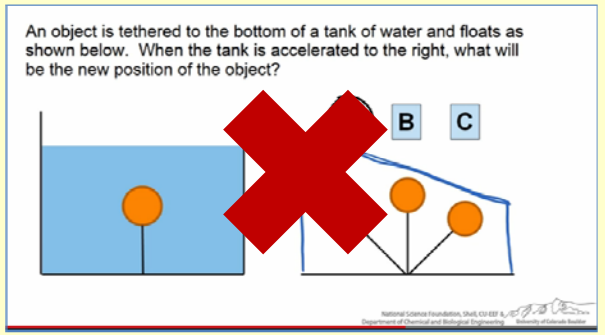


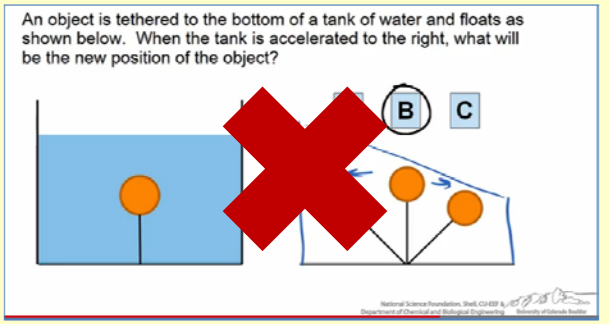
Choice A

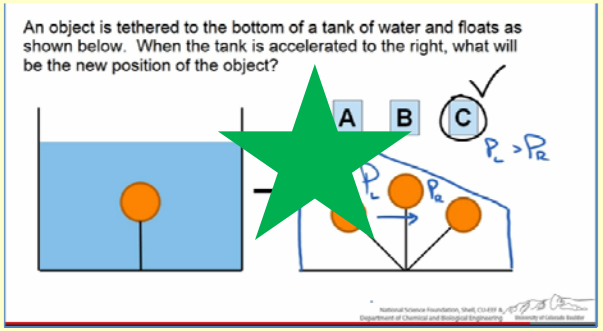
Choice B

Choice C

Video Responses

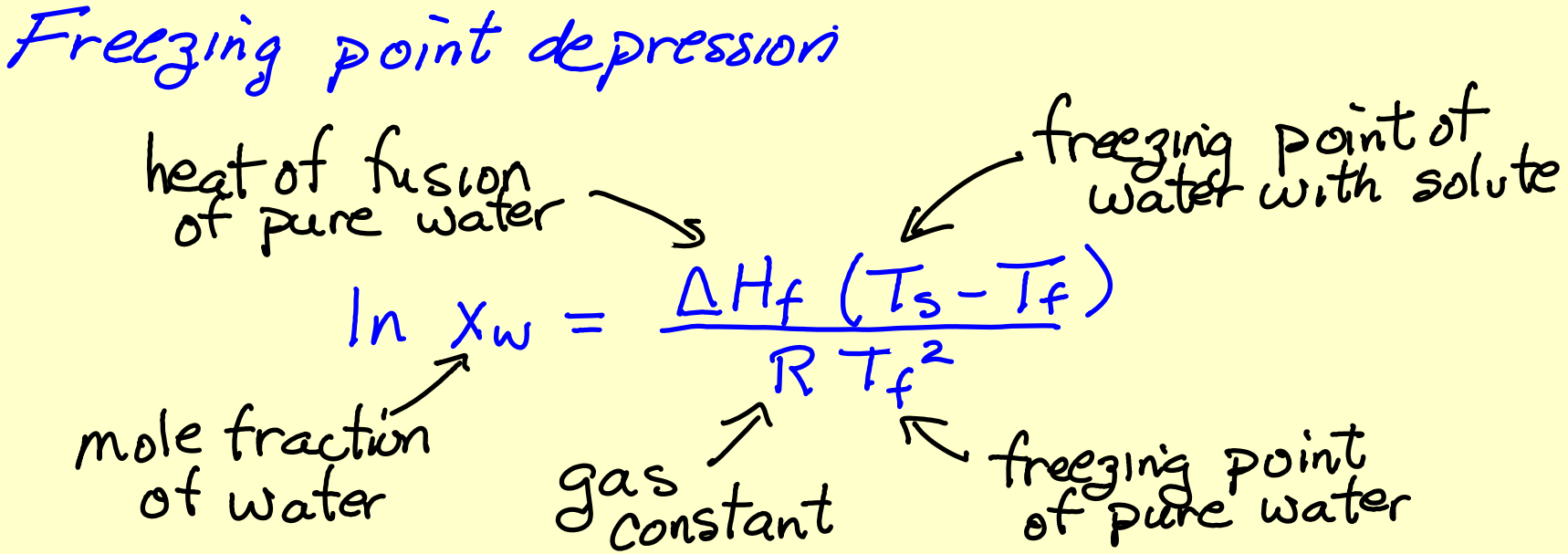






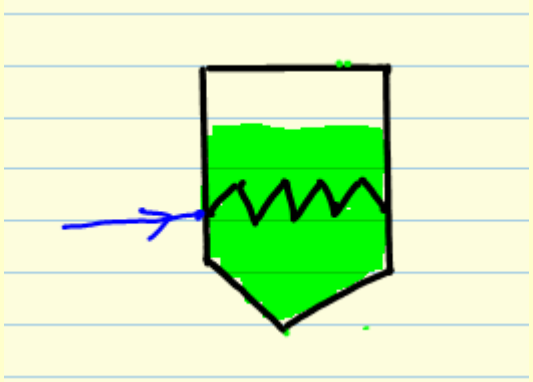
http://www.learncheme.com/screencasts/interactive

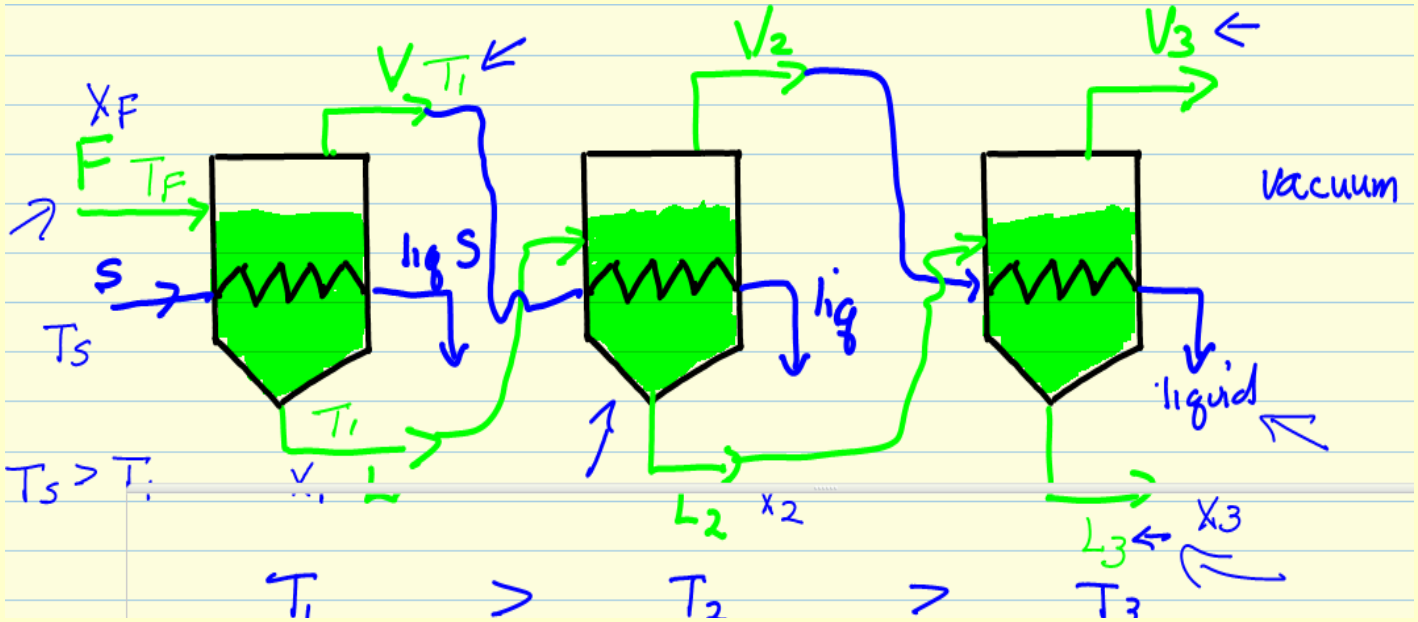
Why screencasts?
Not top to bottom, able to use color and sequence in time



Why screencasts?

minimize cognitive overload





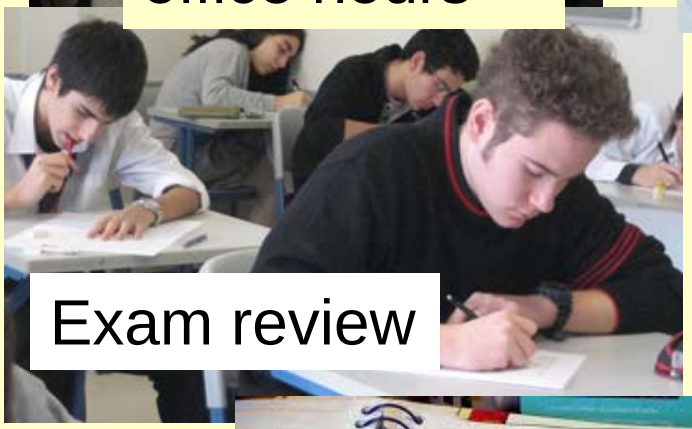
Diagrams and verbal explanation <u>at same time</u> enhance learning [Clark & Mayer, 2011]

How to use screencasts

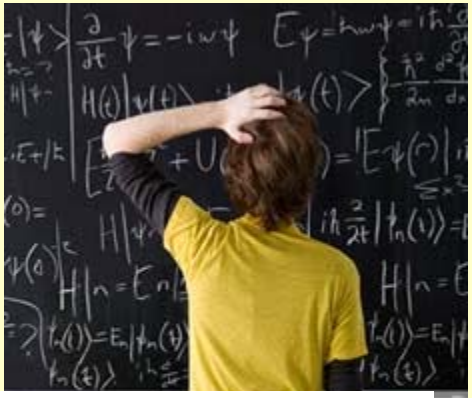
Cannot make office hours

Help solve HW

View before class



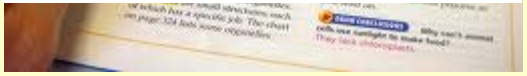
Exam review



Students lack pre-requisites

Online course?

Supplement text



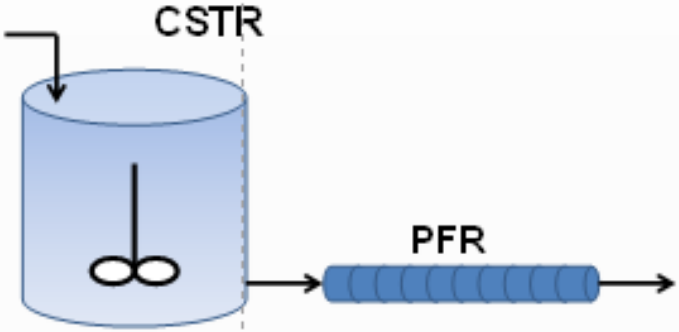
Student who are hesitant to ask

Interactive Simulations

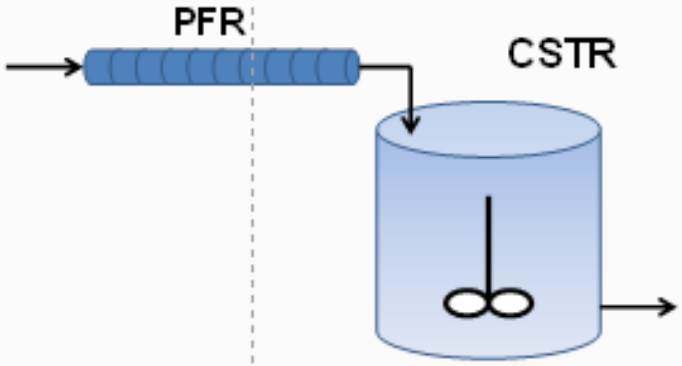
Potential Application

Which system has higher conversion for a 2nd-order isothermal reaction?

A.



B.



C. Same for both

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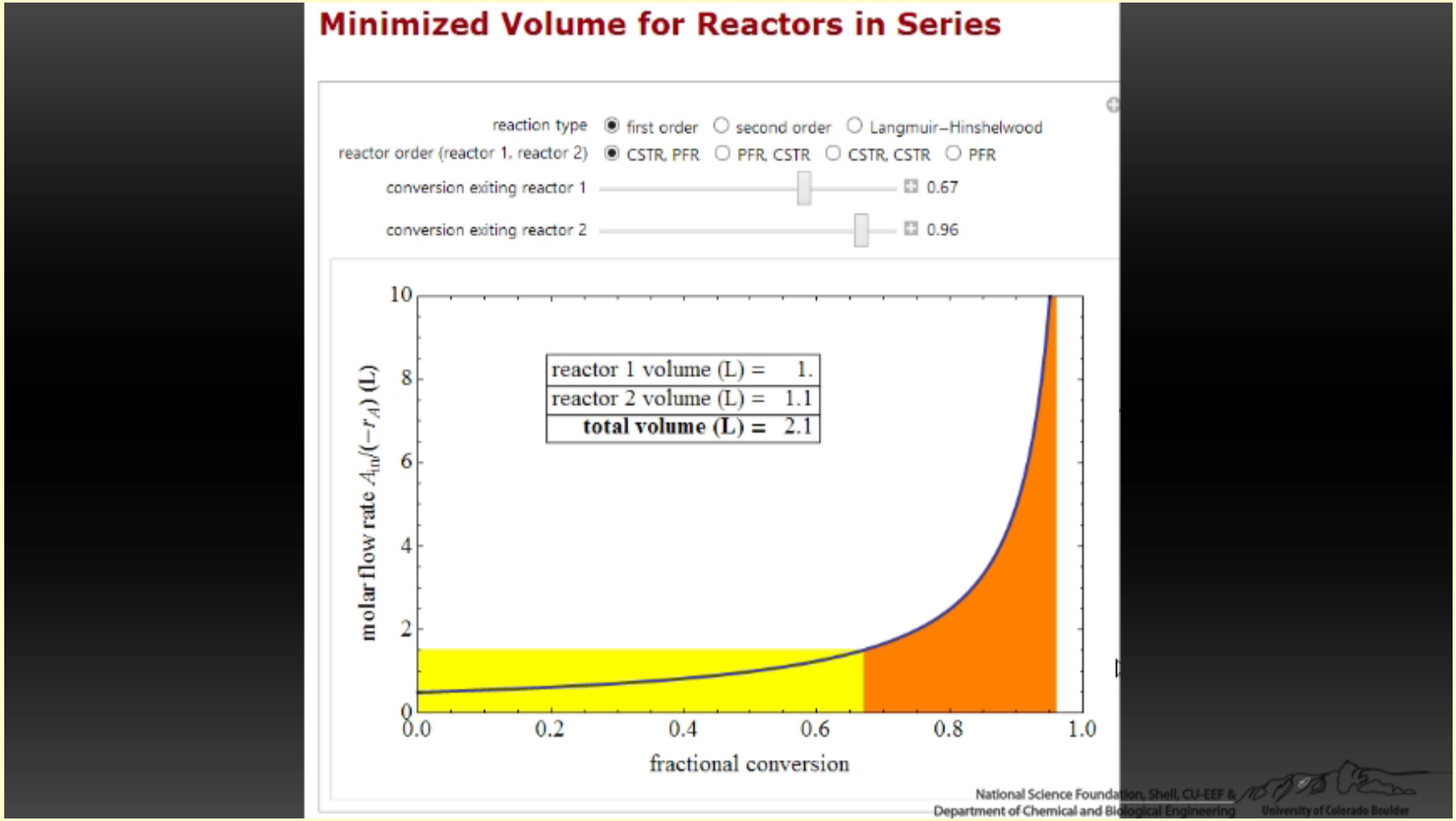
Interactive Simulations



How to use simulations

- In-class demonstration
  - System for conceptual question (ConcepTest)
  - Peer discussion
  - Problem solution
- Generate HW/exam problems
- Pre-class preparation for students
- Textbook supplement
- HW help

What's available?

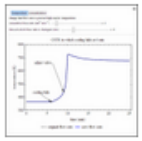
9560 simulations

Wolfram Demonstrations Project™

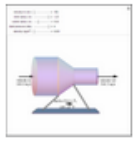
9558 Interactive Demonstrations
Powered by CDF Technology »

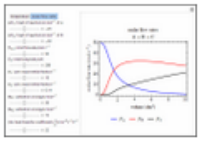
- 425 Chemical Engineering
- 266 Mechanical Engineering
- 205 Electrical Engineering
- 36 Civil Engineering
- 40+ by LearnChemE

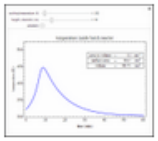
Simulations by LearnChemE

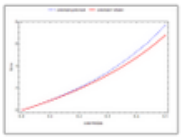

Continuous Stirred-Tank Reactor That Loses Cooling

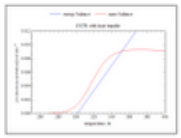

Evaporative Crystallization With Recycle

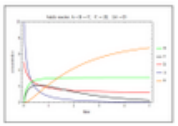

Linear Momentum Balance in Aerodynamic Thrust

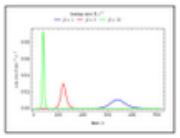

Sensitivity of a PFR to Model Parameters

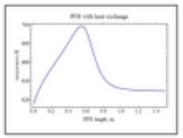

Scale-Up of a Batch Reactor

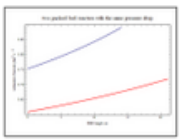

Batch Reactors at Constant Volume or Constant Pressure

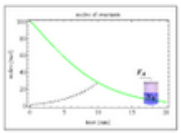

Multiple States in an Isothermal Continuous Stirred-Tank Reactor

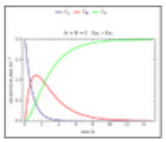

Batch Reactor with Multiple Reactions

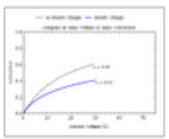

Temperature Programmed Desorption

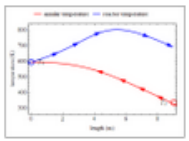

Parametric Sensitivity of PFR with Heat Exchange


Pressure Drop in a PBR using Ergun


Selectivity in a Semibatch Reactor


Series Reactions in a Batch Reactor


Ignoring Density Change in a PFR


Autothermal Reactor

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Educational Resources for Chemical Engineering
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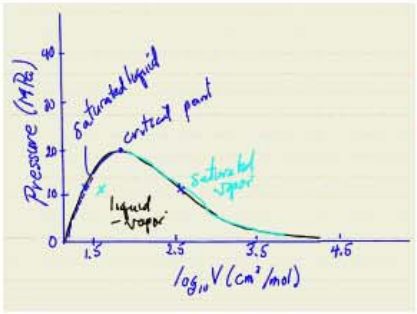
Home Screencasts Simu

www.LearnChemE.com



Screencasts

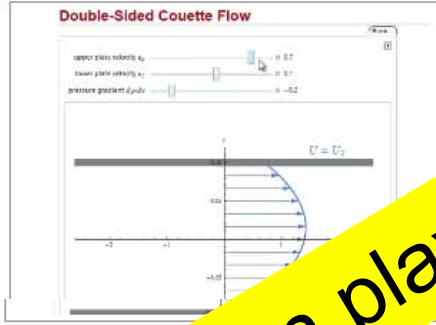
see all sc

Screencasts are short screen captures, usually of a tablet PC, with instructor narration. They are sol
problems, explanations of concepts, software tutorials, introduction to topics, descriptions of
material. Screencasts supplement textbooks, classes, and office hours and allow student

Examples of popular screencasts include:

- *How to use Psychrometric (Humidity) Charts* (Material and Energy
- *Stress-Strain Diagrams* (Material Science)

Interactive screencasts present a multiple choice quest an answer within the video. The video response guides the user to the correct an information, see our interactive screencasts.



Interactive Simu

see all interactive simulations

Wolfram *Math* ifram Demonstrations) are available for a number of chemical engineering topics. T to determine how system behavior changes when variables are changed using sli cessed using free Wolfram based browser plug-ins or using the free Wolfram CDF ulation to be loaded offline; a *Mathematica* software license is not required. For more simulations and their use, go to Wolfram Demonstrations.

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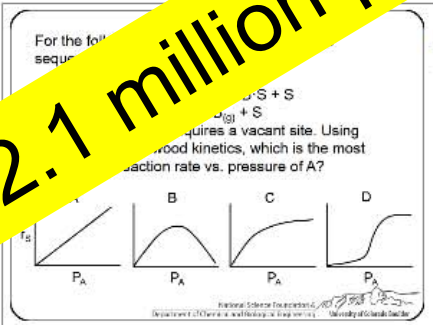

Instructor Resources

see all instructor resources

ConcepTests challenge students with qualitative questions that are not answered by memorization. Used in tandem with peer instruction, ConcepTests can dramatically improve functional understanding while allowing instructors to gauge students understanding immediately and tailor their instruction accordingly.

Course packages provide digital OneNote based resources containing class notes, ConcepTests, reading assignments, screencast recommendations, homework problems and exam questions.

Instructors: Check out the resources to request access our 1300+ ConcepTest inventory or course packages.

>2.1 million plays/downloads in last 12 months