STUDENT LEARNING AND ANALYTICS AT MICHIGAN

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High Return on Faculty Investment: Addressing Diverse Student Needs in Large Lectures Through Screencasting

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Impact of Screencast Technology: Connecting the Perception of Value and the Reality of Performance

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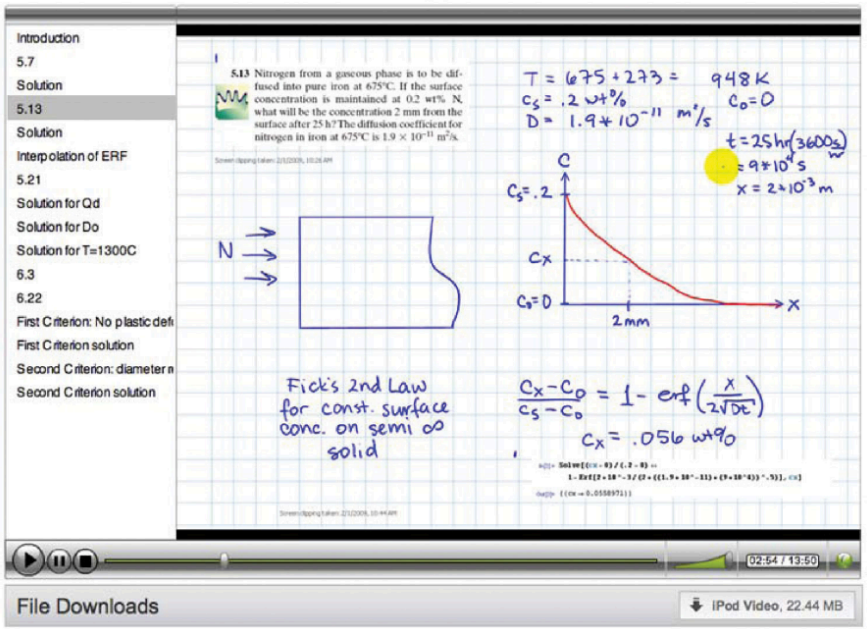
The efficacy of screencasts

- A screencast is…
  - A movie that captures voice, video, and presentation materials
    - Lecture capture
    - Supplemental lectures
    - Homework/exam solutions



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Lecture capture

- Direct recording of what went on in class
  - resolved shear stress lecture

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Supplementary Lecture

- Additional resource
  - Kahn academy

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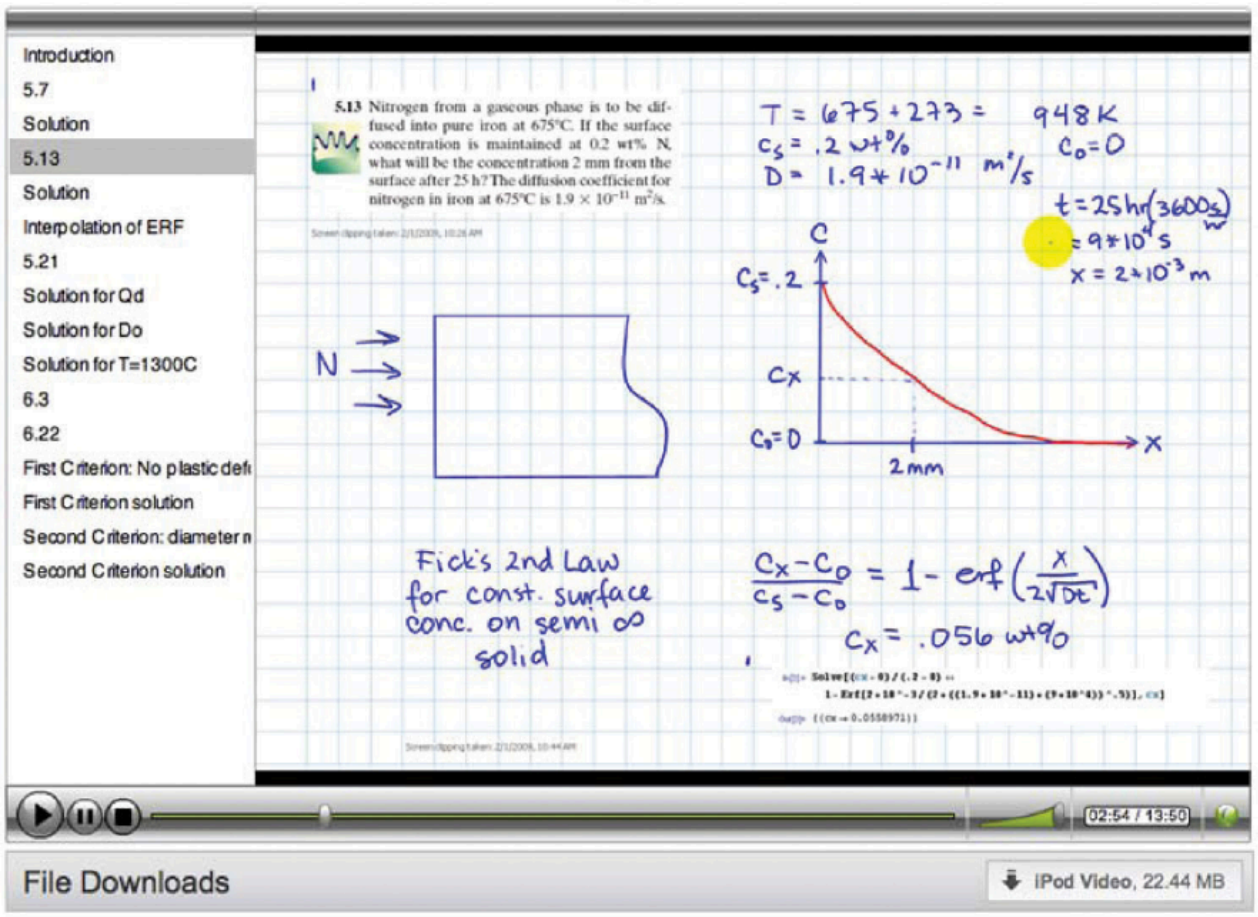
Homework/exam solution



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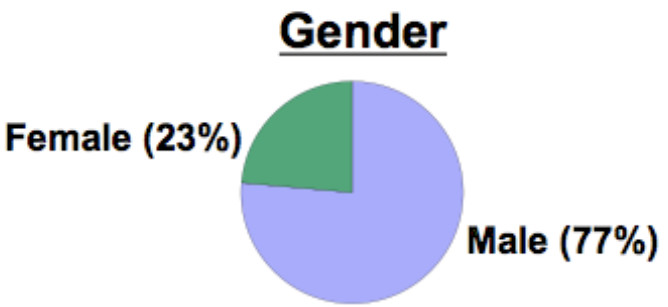
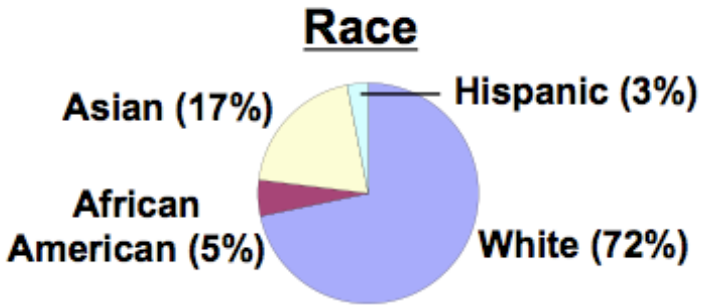
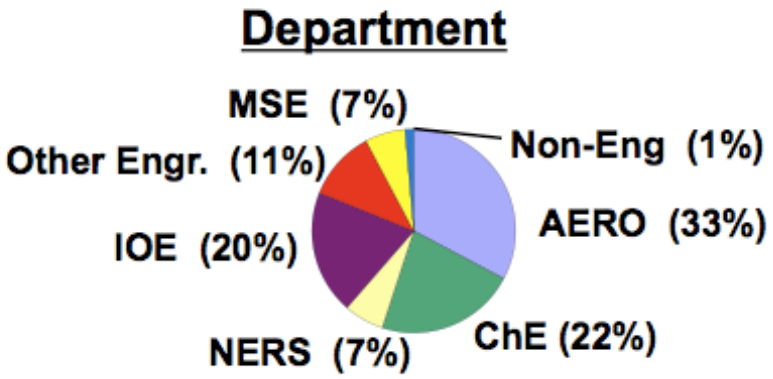
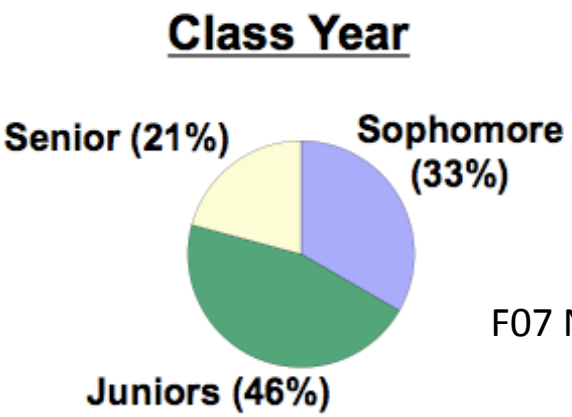
Project Goals

This study documents the strategic use of screencasts in a large introductory Materials Science and Engineering (MSE) course, and examines their impact on student usage and course performance.









F07 N=154 (this data)
F08 N=219
W09 N=181

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Research Questions

- Do students perceive screencasts to be valuable
- Does the use of screencasts promote student self-efficacy and increase performance
- What are the motivations for using or not using the screencasts

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Theoretical Framework

- **Self Efficacy**, students' beliefs about their academic capabilities, has been shown to be strongly linked to their motivation to achieve
  - Intrinsic Motivation- based on an inherent interest
  - Extrinsic Motivation- based on a achieving a desired result
- **Expectancy-Value Theory** states that a person's choice, persistence, and performance on a specific activity is strongly linked to her expectation that she will do well and how much she values the activity
  - Activities that are initially extrinsically motivated can be shifted towards the intrinsic given enough autonomy and success

Zimmerman, Contemp. Ed. Psych. ***25****, 62 (2000)*
Wigfield and Eccles, Comtemp. Ed. Psych ***25*** *68 (2000)*
Ryan and Deci, Contemp. Ed Psych ***25*** *54 (2000)*

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Methodology

- Student Perceptions
  - Midterm evaluations conducted by CRLT
  - End of term survey administered by CRLT
- What really happened
  - Analysis of usage was tested for significance to student data
    - Academic background (Major, Year, Cumulative GPA)
    - Demographics (Gender, Race)
    - Student performance (homework, exams, final grade)
- No analysis on usage was performed until after the final scores in the course we posted.

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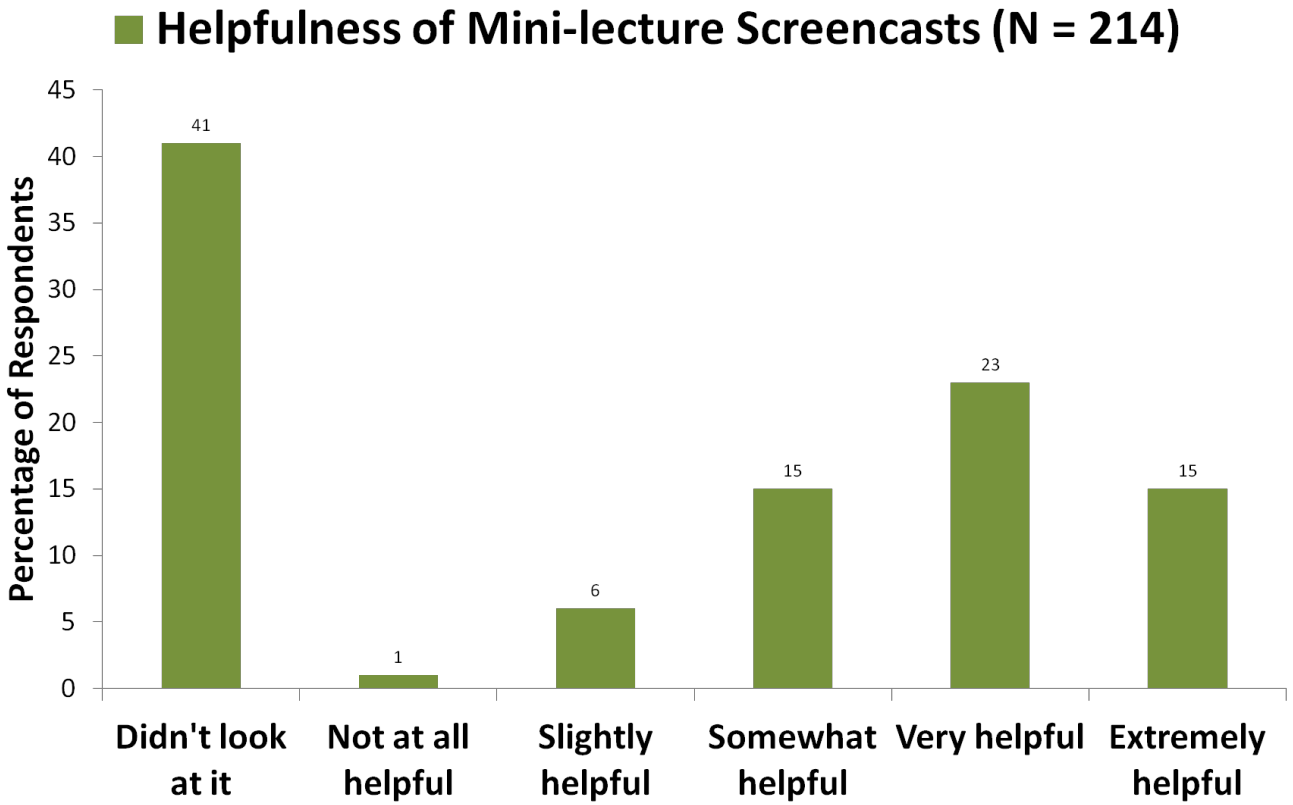
Value



- A majority of students who view the screencasts believe that they are helpful.
- 90% of students agree that mini-lecture screencasts in particular promote a deeper understanding of the course material

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Value

- What the students said
  - *… I felt they were extremely helpful, and much more extensive study tools …screencasts can be downloaded and played on iPods make them very convenient. … and I hope that more professors begin using this technology.*
  - *Screencasts both showed solutions and problem strategies. The verbal explanation makes it more understandable than a simple [homework] solution handout.*
  - *I really liked listening to the solution explanation to the homeworks even if I got the problem right. Just listening to the way the problem was reasoned out in words helped me to remember processes and procedures better.*

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Value

- Students tend to watch screencasts from start to finish
  - The highest watchers were more likely to watch the entire homework solution screencasts
  - Those who watched the entire hw screencast were more likely to have lower homework grades

Strategies for

I got things wrong and wanted to fix them

.

			lecture ($n = 196$)	
	Number	Percentage	Number	Percentage
Watched entire video from start to finish	68	33	129	66
Re-watched certain segments based on my homework responses	54	26	10	5
Went to specific points to review	40	19	24	12
Watched large chunks looking for information	29	14	18	9
Browsed around	18	9	15	8

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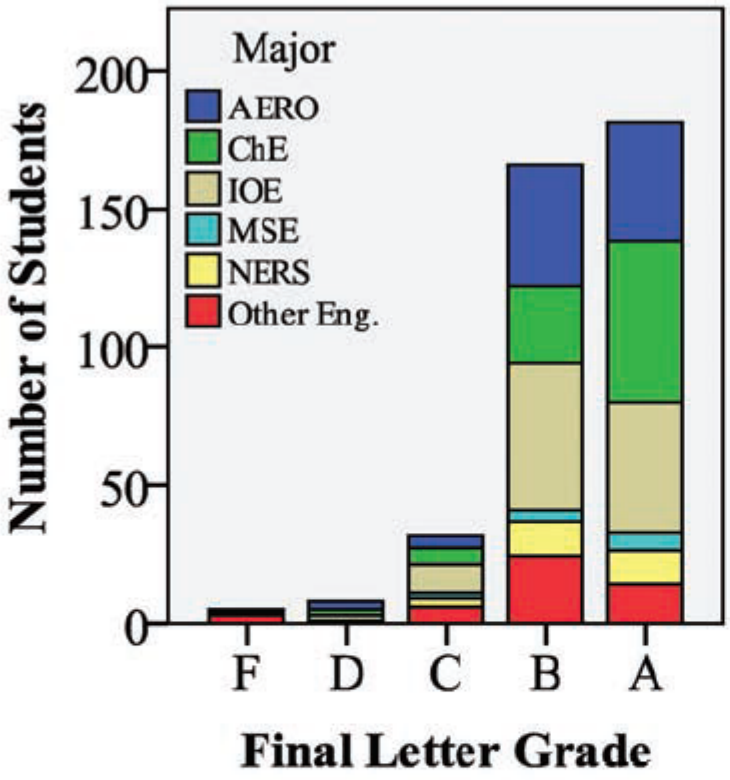
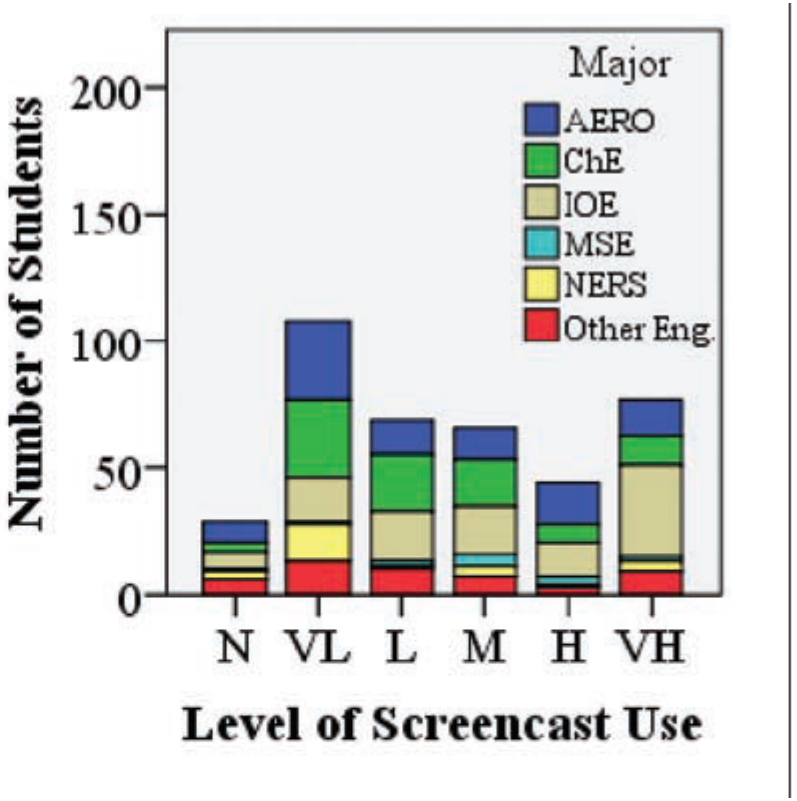
Performance

- Screencast usage was positively and significantly correlated to overall performance in the course





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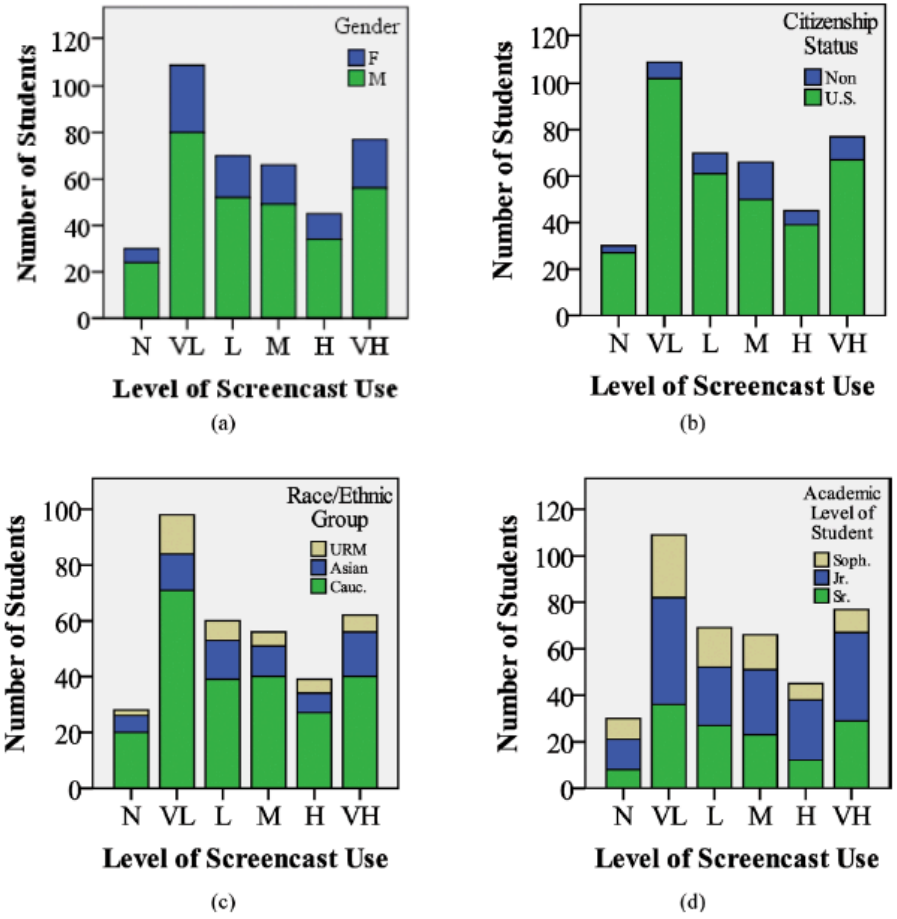
Performance

- Examined different groups of students to see if there were differences
  - No signifcance across gender, citizenship, ethnicity, academic level



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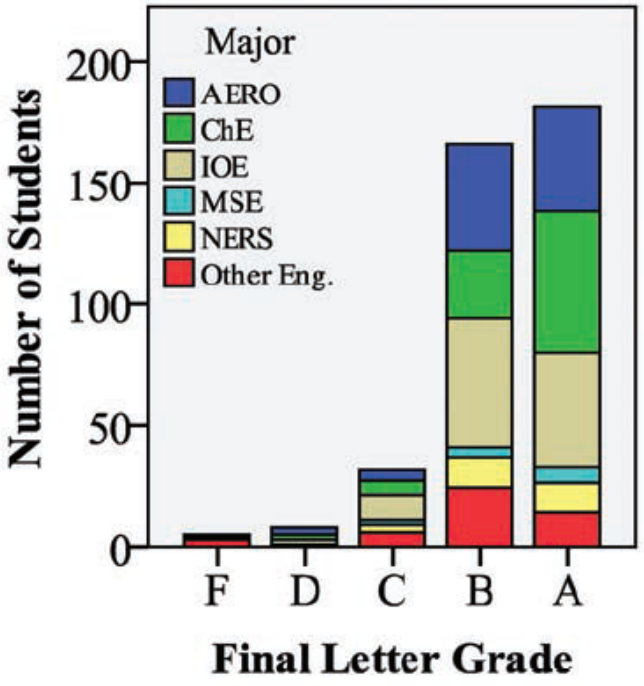
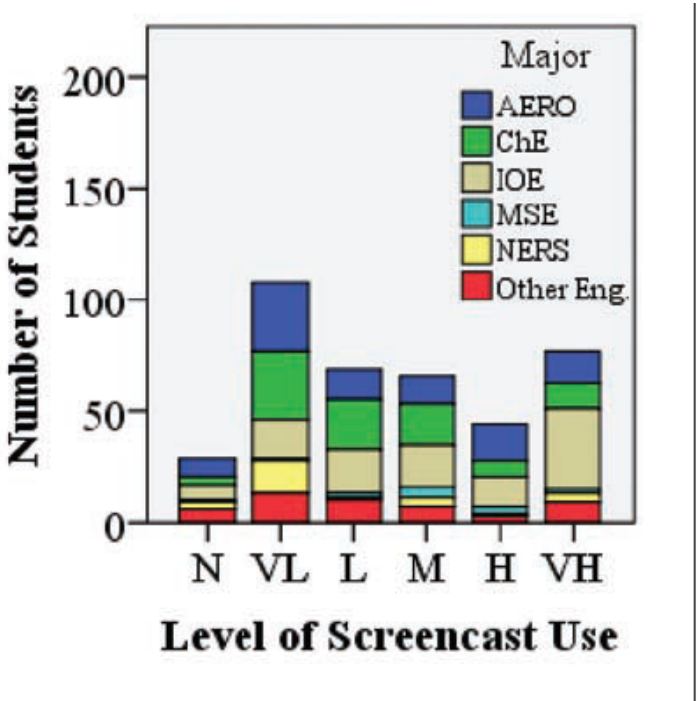
Performance

Significance across major

- ChE use screencasts at lowest levels, while receiving the highest grades
- IOE use the screencasts the most, and receive average grades. Prior to the introduction of screencasts; IOEs received the lowest grades.





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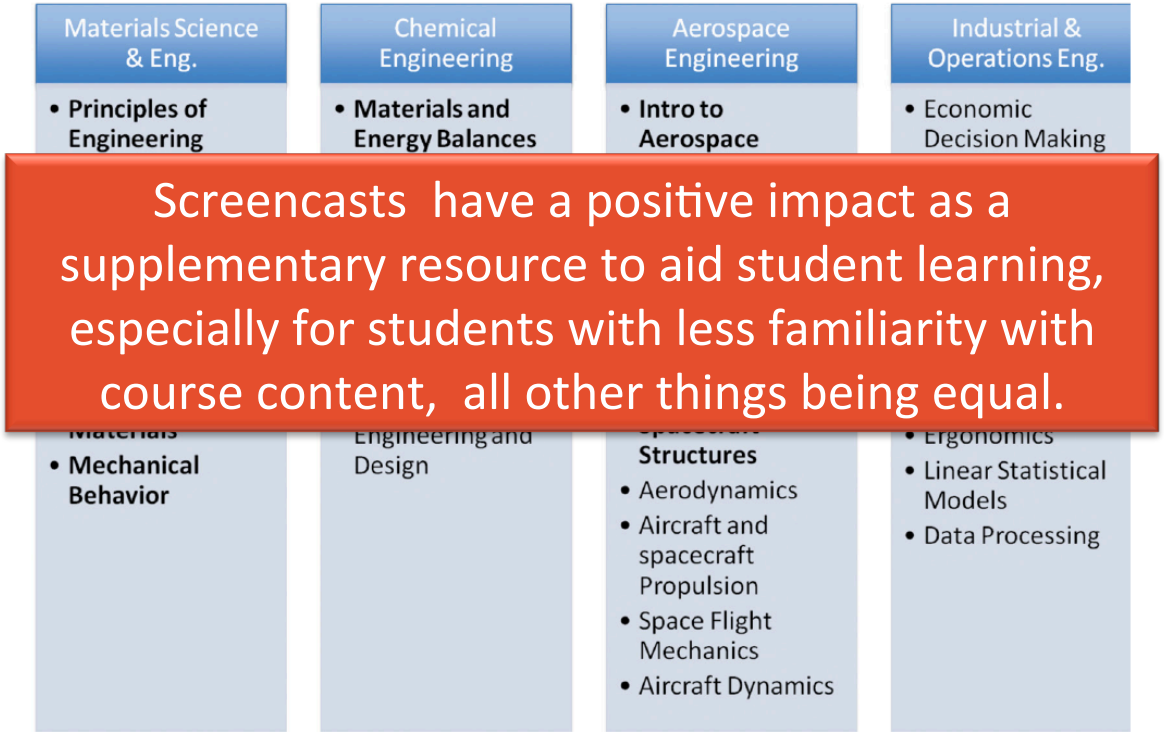
Performance

- The ChE Curriculum contains many MSE topics covered
- The IOE curriculum contains no MSE topics covered



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Performance

- Case study: Examined the impact of screencast usage on ability to answer exam questions.
  - If IOE students watched ANY screencasts, they performed better on a PARTICULAR question
  - If IOE students watched a PARTICULAR screencast, the significance was even stronger for the performance on that PARTICULAR question
  - Also somewhat true for AEROs

Screencast Use and Performance on Final Exam Question One by Students' Major (Pearson Correlations)

		Number of Web site hits & polymer structure final exam question		Number of views of polymer structure screencast (range = 0 to 5) & polymer structure final exam question	
Major	*n*	Correlation	Sig.	Correlation	Sig.
AERO	34	$r = 0.350^{*}$	$p = 0.042$	$r = 0.345^{*}$	$p = 0.046$
ChE	45	$r = 0.123$	$p = 0.421$	$r = 0.177$	$p = 0.243$
IOE	60	$r = 0.425^{**}$	$p = 0.001$	$r = 0.375^{**}$	$p = 0.003$

$^{*}p < 0.05$; $^{**}p < 0.01$.

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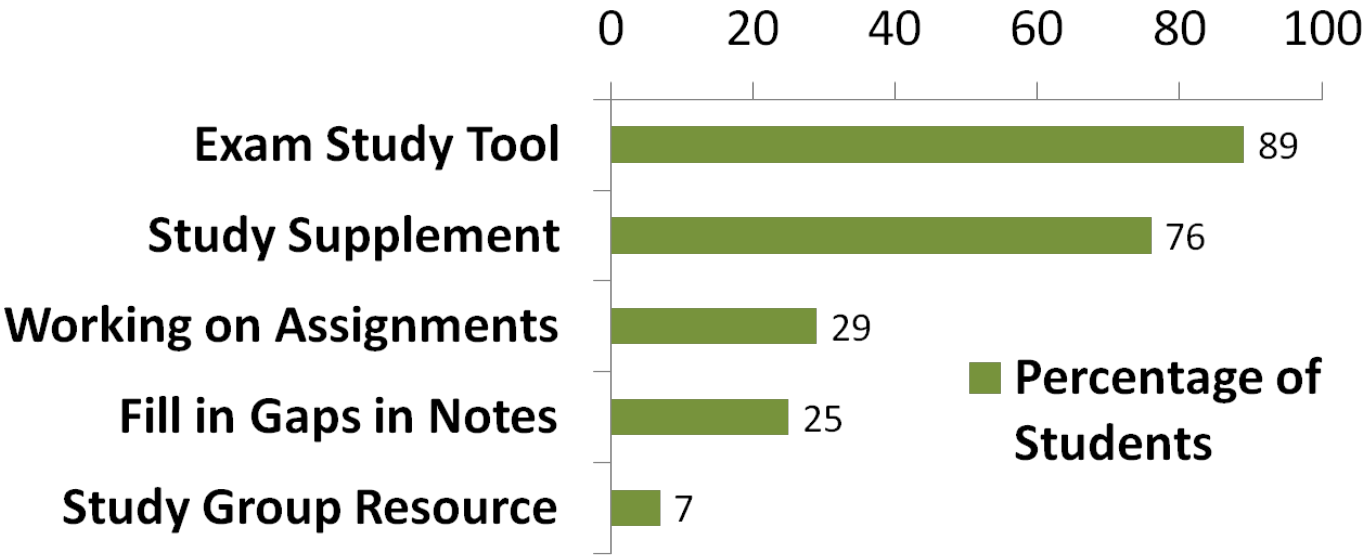
Motivation

- Students are motivated to use the screencasts because they are perceived to be helpful and they are shown to improve course performance



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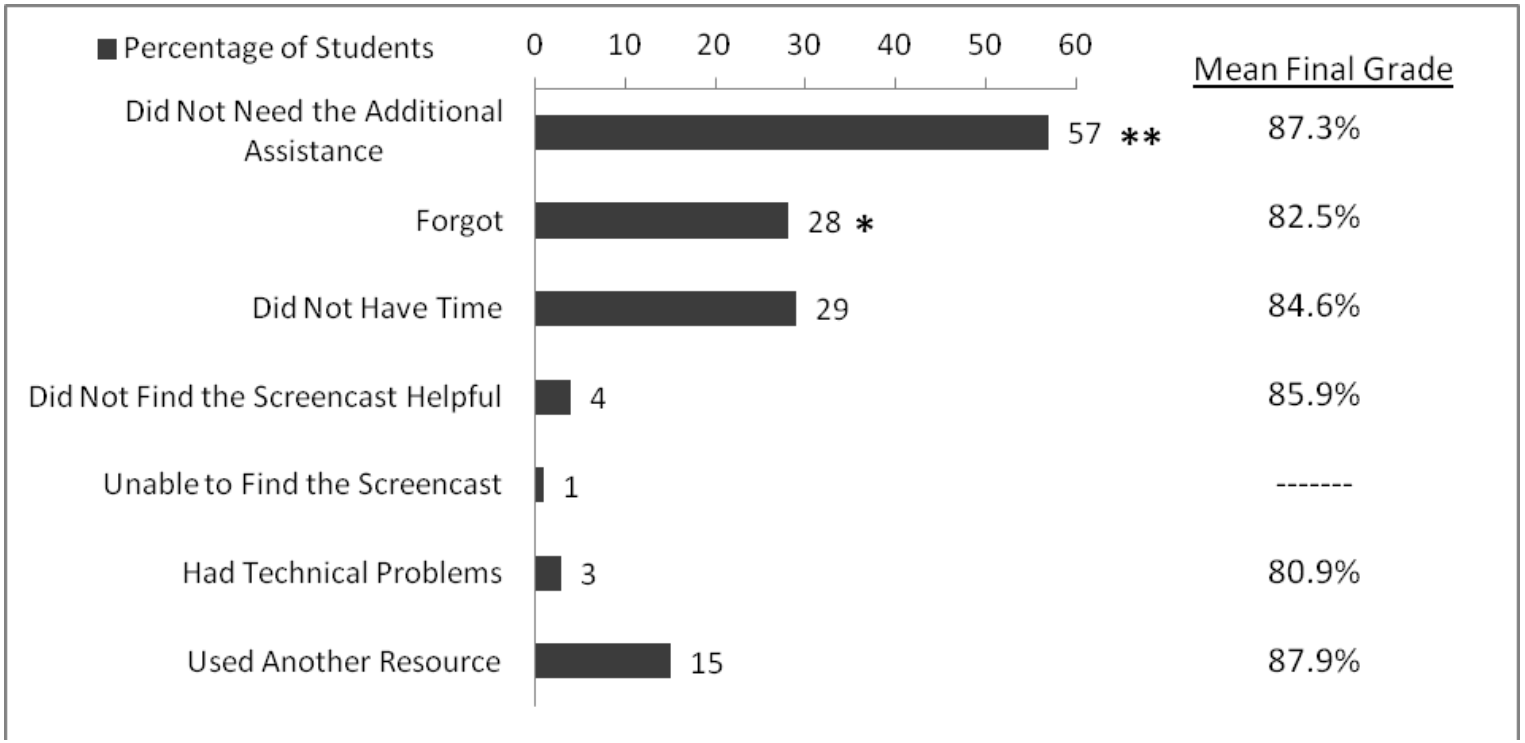
Motivation

- Why do only 58% of the students use the screencasts?



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What we've learned

- Screencasts are useful for explaining concepts and procedures.
  - Shift first exposure of a concept
  - Level the playing field
  - Allow for more active learning during class
- They appear to enhance student self-efficacy
- How to publish in the Ed literature
  - K. Green, T. Pinder-Grover, J. M. Millunchick, Journal of Engineering Education **101** 717 (2012)
  - T. Pinder-Grover, K. R. Green, J. M. Millunchick, Advances in Engineering Education **2** 9 (2011).

Screencasting Best Practises

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Technical Requirements

- On your own computer
  - Software
    - Camtasia $$$
    - Screenflow $$
    - Jing free
  - Microphone
- Course management system

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Challenges

- Not a substitute for good teaching
- Can be a time sink if you let it
- Uploading large files to CMS can be a pain

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Best Practices

- Content Preparation
- Recording
- Editing and Production
- Publish

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Content Preparation

- WHY are you doing it?
- Decide on your production quality
  - YouTube vs Hollywood
- Start Small

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Recording

- Have your materials ready
- Speak normally
- “Take two”
- Use your cursor to point
- Record in short segments

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Editing and Production

- Watch the tutorials if they exist
- Cutting
- Zoom and pan
- Chapters
- Make it web friendly

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Publish

- Upload to Ctools
  - Native upload tool
  - Third party upload tool (cyberduck)

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