

Virtual Workshop on
Enhancing CS courses



1.1-1.2

Using videos in CS instructions (15-min)



Virtual Workshop on Enhancing CS courses

2. Using video in CS instructions

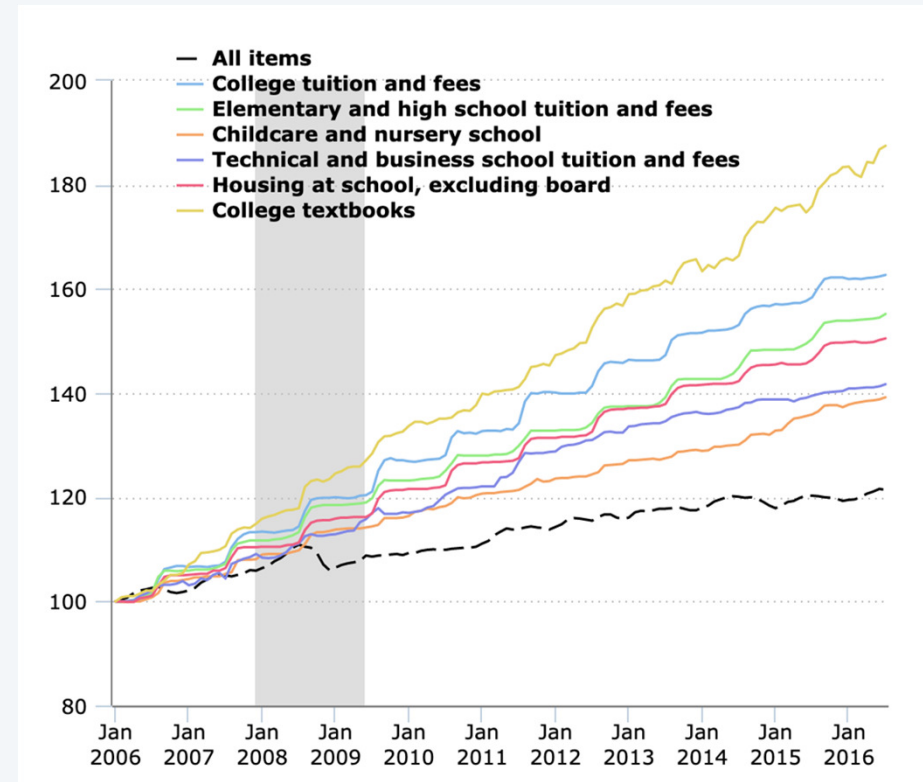
- Why use videos?
- Finding videos
- Creating videos
- Curating your own collection
- Advantages of a flipped learning model
- Using dashboard analytics
- Demos

Textbooks in a Death Spiral

- Textbook sales have declined **41%** since 2008
 - 65%** of students opted not to buy textbooks due to cost (2017)
- Industry has made a pivot towards digital technology
 - The strategy has not been centered around video
 - Industry is still struggling

“(The textbook industry) has not settled on a business model that works.”

Michael Spinella (Textbook and Academic Authors Association)



Generation Z: They Love Videos

- YouTube is the #1 preferred learning method
- More likely to prefer [YouTube](#) and [learning apps](#) over textbooks
- Less likely to believe they can succeed in their career without college
- Use more modern versions of social media to share information (Snapchat and Instagram)
- Do not see technology as transformative, rather it's an integral part of their life

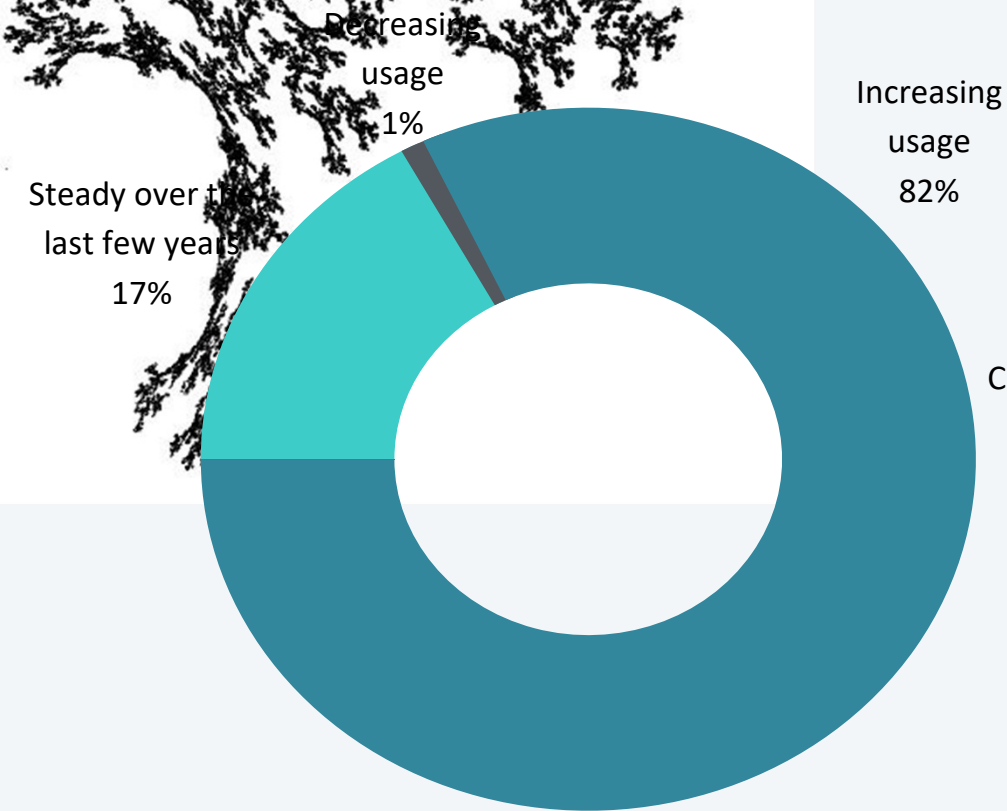
Learn best on a laptop

Virtual Workshop on Enhancing CS courses



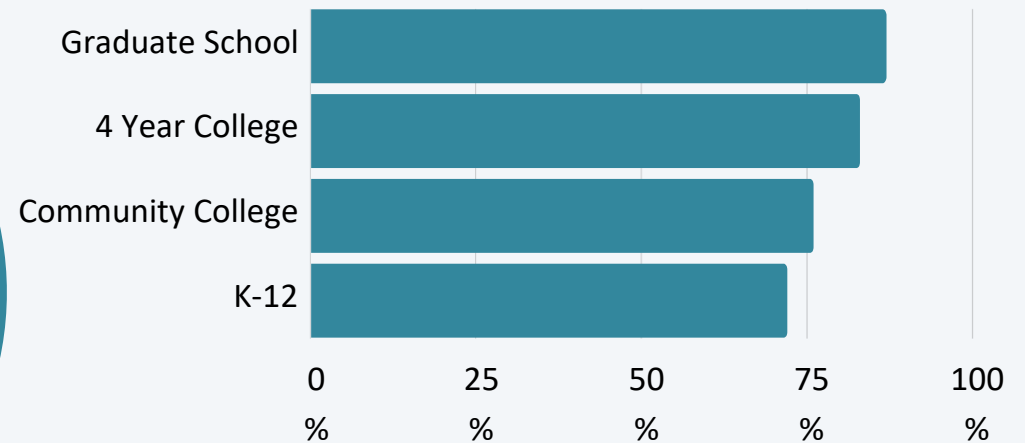
Source: "Beyond Millennials: The Next Generation of Learners Study, 2018

College-Age GenZ Students Expect Video to be a Part of Their Learning Experience



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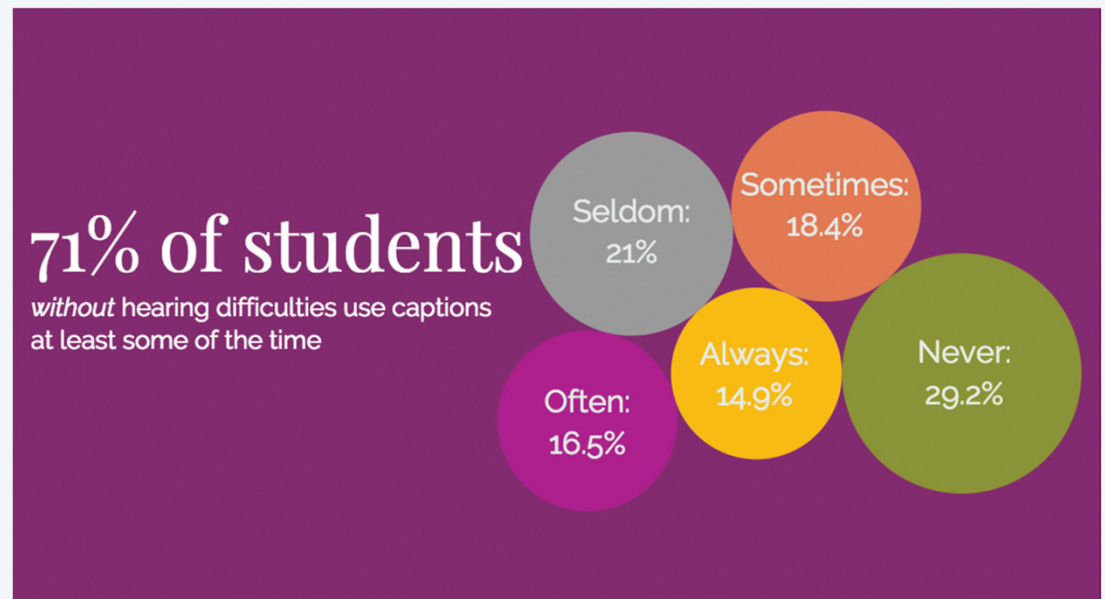
By Institution Type



Usage is an increasing trend as students grow

98.6% of Students Find Captions Helpful

- Studies show student performance improves with use of captioning
- Captioning also benefits students who:
 - Struggle with reading
 - Are learning English as a second language
 - Want to increase their literacy skills
 - Are visual learners
- 80% are more likely to watch the entire video if captions are enabled



“While use of video is widespread across campus, for many different purposes, hurdles to fully leveraging video remain. Still, educational institutions highly value video and look forward to new technologies, including an increasingly personalized learning experience.”

Kaltura Sixth Annual State of Video in Education, 2019



The need for curated, searchable, high quality content in higher education will accelerate since online learning is at demand

@2020 Andy Guna

Using curated videos in instructions

1. The value of a traditional lecture (50-80 mins) has **diminished** since many of the general concepts discussed are available to students on YouTube and at other sources (as needed)
2. Use of curated videos **saves** a lot of instructor time in preparing and delivering standard lecture slides.
3. Use the class time for **more active learning** such as collaborative problem solving, examples, assignment discussions etc
4. Structure meeting time as **mini-lecture → examples → exercises → live coding**
5. Instead **focus more** on discussing things that matter to your students when you have a chance to meet
6. We will show two examples of courses that use a new instructional approach
 1. Princeton University Introduction to Computer Science
 2. Rutgers University Introduction to Computer Science



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2. Using video in CS instructions

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Finding videos ([more in breakout room](#))

1. Videos are a key component of creating an effective curriculum
2. Videos free up instructor time to do more important things by deviating from traditional lectures
3. How do we integrate videos to our courses? create or find?
4. Sometimes best studio-produced are available (e.g. CS111 course at Rutgers)
5. Integrate book videos with your own videos to create a customize collection (workshop)
6. There are thousands of free videos on YouTube
7. Certain keywords can help you zone in on better videos
8. But Validating the videos can be a daunting task
9. Finding the right video for your class can also be a difficult and time-consuming process
10. Do not provide recorded lecture videos from other institution to your students (e.g. OCW)
11. You can also investigate length of the video and analytics to see if that is something you recommend to students.
12. It is important that video style match your individual teaching style.



Virtual Workshop on Enhancing CS courses

2. Logistics of video usage

- Finding videos
- Creating and uploading videos
- Integrating videos into the course
- Advantages of a flipped learning model
- Using dashboard analytics
- demos

Creating and Uploading Videos ([breakout room](#))

1. There are many tools to create videos, such as Camtasia, adobe capture, Kaltura
2. Camtasia is the easiest and most affordable tool to use. \$150
3. When creating videos, keep the videos to length 10 minutes or so. Record them in 2-3-minute chunks and combine them
4. Properly index the videos and organize them, so that it is easier to edit things later.
5. You can swap one chunk for another chunk or re-record something



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Integrating videos into the course ([breakout room](#))

1. Videos have become the favorite media for students to learn concepts
2. Make videos a key component of your instructional strategy
3. Videos are now more popular than textbooks.
4. Videos increase student engagement as content is presented in visual and auditory media
5. For ADA compliance, often you need to provide transcription as well.
6. Videos provide a just-in-time means for students to learn concepts
7. Videos also provide a great tool to review and prepare for exams



Virtual Workshop on Enhancing CS courses

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- Advantages of a “flipped” learning model
- Using dashboard analytics
- demos

Advantages of flipped learning models ([breakout room](#))

1. Not all students comprehend material at the same speed
2. Recognize that there is wide academic diversity in your class
3. One lecture cannot teach everyone the concepts you plan to communicate
4. Students need more time to visit and revisit content before they can understand
5. By providing all the core concepts on video, you can focus more on teaching what students really need – problem solving, assignment discussion, exam prep, examples
6. Research shows that you keep more student attention when you solve problems in class, live.
7. There are few elements you need for flipped lectures – well-produced videos, collaborative exercises, individual exercises, mini-lectures
8. Planning what to do when you meet with students depends on data that you see from student activities.
9. The student engagement data becomes key to designing engaging activities



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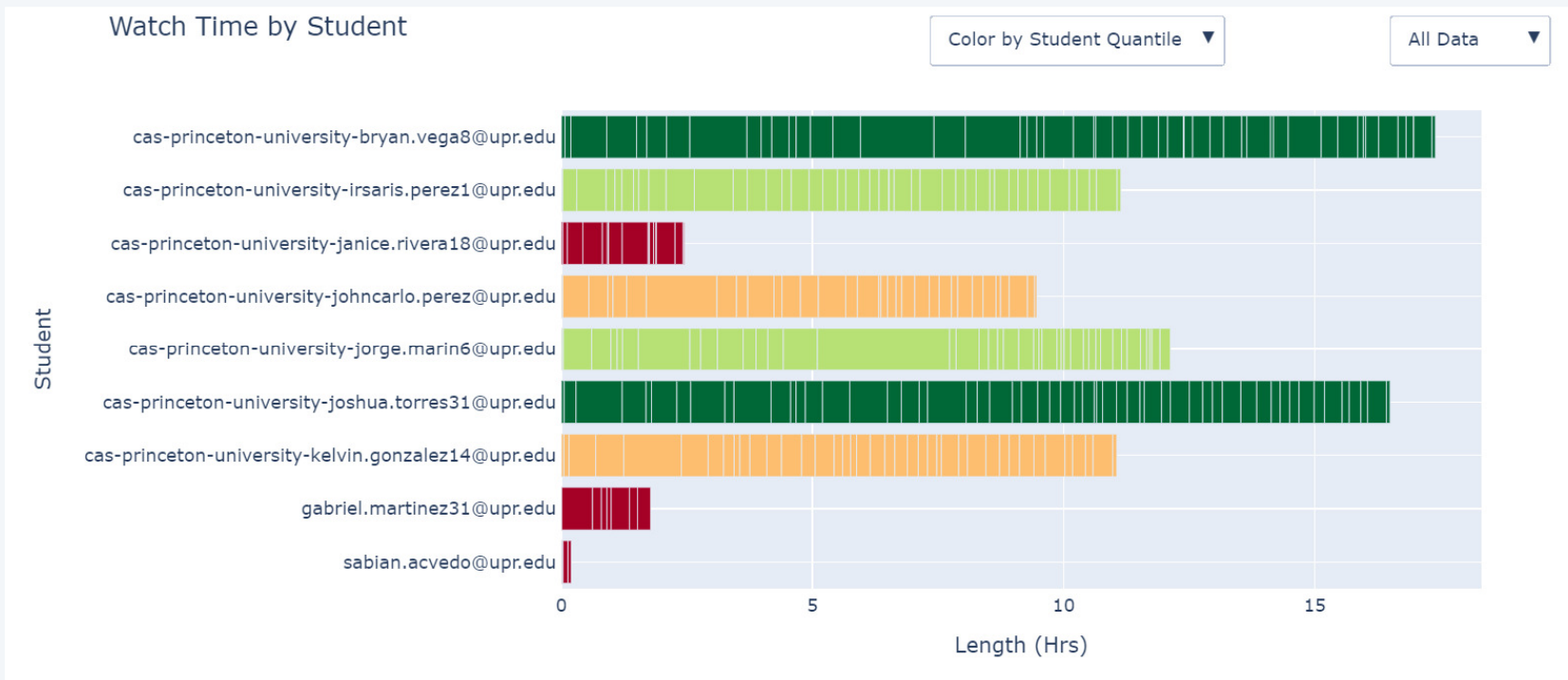
2. Logistics of video usage

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- Advantages of a flipped learning model
- Using dashboard analytics (breakout)
- demos

Using dashboards (to be covered in breakout room)

1. Comprehensive dashboards can be a tool for successfully executing a flipped learning strategy
2. Dashboards provide data on student engagement with videos
 - Which students are spending the most amount of time?
 - Which students are spending the least amount of time?
 - Which videos have been watched the most/least? What does that mean?
 - Which video “segments” have been watched the most? What does that mean?
 - How do students engage with videos through questions?
1. How can question data help make decisions about what to address in a synchronized class?
2. How can we understand student behavior on an activity timeline?
3. What are the questions and answers we need to ask and know?
4. How can we use visualizations or CSV activity data files to find the answers
5. We will discuss more details on this at the breakout session on video usage

Example Dashboards



Provides total watch time by each student in a small group. The green and red colors show the top quantile and lowest quantile (both can be interpreted in different ways)



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Demos

[Syllabus](#) [Meetings](#) [Lectures](#) [Precepts](#) [Assignments](#) [Exams](#) [Help](#)

SYLLABUS

Description. This course is an introduction to computer science in the context of scientific, engineering, and commercial applications. The goal of the course is to teach basic principles and practical issues, while at the same time preparing students to use computers effectively for applications in computer science, physics, biology, chemistry, engineering, and other disciplines. Topics include: programming in Java; hardware and software systems; algorithms and data structures; fundamental principles of computation; and scientific computing, including simulation, optimization, and data analysis.

Prerequisites. None.

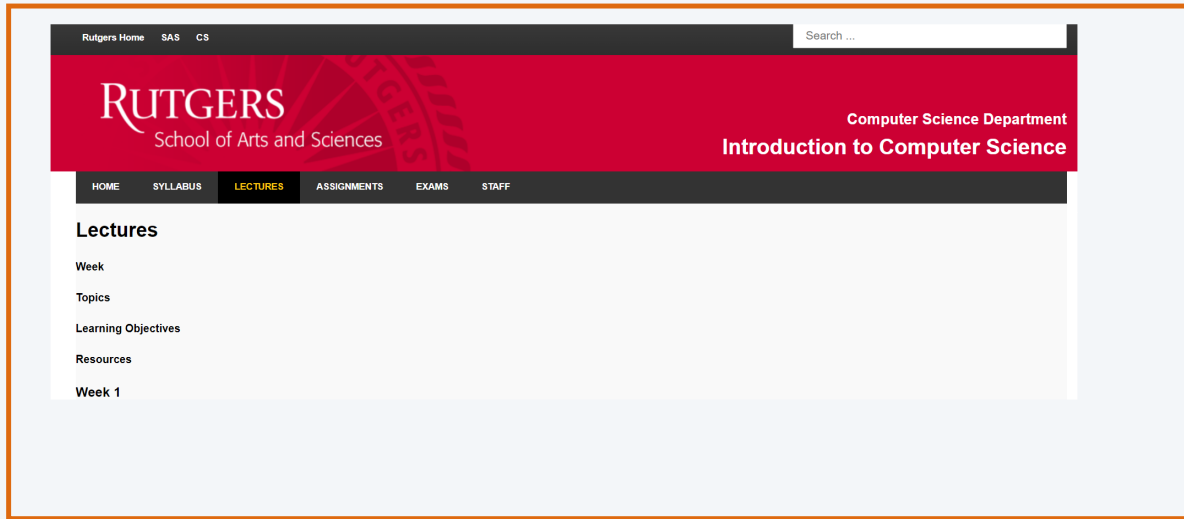
**Textbook.** R. Sedgewick and K. Wayne, *Computer Science: An Interdisciplinary Approach*, Addison-Wesley Professional, 2016. ISBN 978-0134076423. We will be referencing this text all semester. The lectures are based

Introduction to Computer Science – Princeton University

Core ideas

- No formal lectures
- All fundamental content is delivered via studio-produced book videos
- Lecture time is dedicated for problem solving, code examples, exam discussions etc
- High satisfaction among students on the new model of teaching and learning
- Implemented for large CS courses at Princeton (900+ students per year) since 2017

Demos



Introduction to Computer Science – Rutgers University

Core ideas

- Taught in a hybrid format
- Some lectures (200+ students) deliver content via studio-produced book videos
- Lecture time is dedicated for mini-lectures, problem solving, code examples, exam discussions etc
- Implemented for large CS courses (3000+ students/year) at Rutgers since 2019
- High satisfaction among students on the new model of teaching and learning



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