



Creating Engaging Video Lectures

You'll learn about

- Planning video lectures
 - Build video lectures based on assessment items (and learning outcomes)
 - Segment videos into the smallest logical unit (suggestion: 4-9 minutes)
 - Have lecture-level learning outcomes
 - Create extra lecture materials addressing common questions or challenges
 - Use multimedia research-informed strategies to help learners focus
 - Use Coursera's in-video quiz system
- Getting started recording video lectures
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Overview

MOOC video lectures allow instructors to reach thousands of learners around the world, at the times they are available. This comes at the cost of the direct learner engagement that happens inherently in lecture hall. Instructors are unable to read learner confusion from frowning faces and learners aren't able to raise a hand to ask a question. Experience with good Coursera instructors suggests the downsides of this tradeoff can be addressed.

RECOMMENDATION: Hone and augment lecture

Since learners aren't able to interact during video lecture filming, instructors have to work harder to anticipate common misunderstandings and questions. Specific recommendations include:

- explicitly situating the lecture content (e.g., explaining how it fits in the course or with learner outcomes),
- have a clear plan of what students should get out of each video lecture
- build in extra materials to address anticipated learner confusion
- do more examples

Essentially, to overcome lack of immediate interaction, lecture materials generally have to be honed and augmented.

RECOMMENDATION: Use technology to support learning and engagement

Coursera tools be be utilized to reduce negative impacts from video lecture. This technology also brings benefits such as the ability to replay video and engage learners with in-video quizzes.

As video lectures are often where learners spend the most time in courses, it is worth the extra effort to make them as effective as possible.

Looking for information on technical aspects of video production?

- How to add in-video quiz questions to my video lecture?
- What kinds of in-video quiz questions does Coursera support?

Planning video lectures

Build video lectures based on assessment items (and learning outcomes)

Teaching open online courses differs from teaching of traditional university courses in core aspects (for more information see the [Course Planning and Design Guide](#)):

- Teaching **volunteer learners** around the world
- Supporting **mastery learning** through increased, technology-enabled assessment opportunities

Course development that begins with learning outcomes and aligned assessments to allow learners to test their mastery of those outcomes is helpful in designing a successful Coursera course. Video lecture is best developed afterwards, to support learning outcomes and assessments.

RECOMMENDATION: Print out all course assessments and learning outcomes. Use the list to drive video lecture content

If assessments are already designed, they can guide video planning -- making sure knowledge or skills required for each assessment is taught in one or more video lectures. Learners missing an assessment item will seek to learn what they have missed by searching video lectures. If they can't find video lecture content that clearly teaches this topic, they are likely to seek assistance (e.g., on discussion forums). Instructor effort in answering forum questions can be reduced through careful alignment of video lecture content with assessments.

Segment videos into the smallest logical unit (4-9 minutes)

Although MOOC-specific research seeking to identify "optimal" video lecture length is very preliminary, many studies on attention in the lecture hall confirm -- human attention wanes quickly (Bunce, Flens, & Neiles, 2010).

RECOMMENDATION: Create short videos (4-9 minutes)

RECOMMENDATION: Give videos explicit, descriptive and inviting titles

Many concepts require more than 9 minutes to adequately teach. But breaking concepts down into the smallest logical unit can support the following:

- encouraging learners to "watch just one more" (more likely for 6 minutes than 20)

- promoting easy review (the title explicitly states what learners will see, without having to scan through 50 minutes)

See examples in the table below showing video lecture title and length (in minutes):

Basic Video Lecture Design	Explicit, Descriptive, and Inviting Video Lecture Design
Array Insert (21:08)	Inserting an Element into an Array: Process Overview (4:58) Inserting an Element into a Not-Full Array INCORRECTLY (7:12) Inserting an Element into a Not-Full Array Correctly (3:45) Inserting an Element into a Full Array (5:13)
Malthusian Catastrophe (13:28)	Malthusian Catastrophe: Arithmetic Agricultural Model (5:11) Malthusian Catastrophe: Carrying Capacity Model (3:20) Malthusian Predictions - Wrong (so far) (6:07)

Have lecture-level learning outcomes

Each video lecture should have 1-2 learning outcomes it addresses. These are most useful when they complete this sentence: “By the end of this video lecture you should be able to answer...” (Simon & Taylor, Smith & Perkins)

RECOMMENDATIONS:

- Write 1-2 learning outcomes for each video lecture
- Phrase these in the form of questions a learner should be able to answer after the video
- Present them at the beginning of the video*
- Allow learners to test their understanding at the end of the video*

Learners primed with a goal for watching lecture are better able to direct their attention. Research shows that forming appropriate organizational structure and ability to notice important content or features are expert skills (Hrepic, Zollman, & Rebello, 2007) (Ericsson, 2006). While it may seem obvious to an expert instructor what should be learned in a video -- since learners aren't experts, they benefit from being told what to attend to.

*The next section discusses using in-video quizzes to both present and allow learners to self-assess learning outcomes.

Create extra lectures addressing common questions/challenges

“Of course, our already prepared lectures and explanations are perfectly clear to our students. We know this because students never ask questions, never come to office hours, ask for help from TAs, and all students earn A's. Right.”

--Dr. Beth Simon, Principal Teaching and Learning Specialist, Coursera and Faculty, Computer Science and Engineering, University of California, San Diego

RECOMMENDATION: Create a set of videos based on common learner questions

Questions to address can come from a variety of sources: instructor brainstorming, previous discussion forums (even from on campus), etc. Another option is to create these videos during the first offering of the MOOC. Marking these videos a part of a series specifically as answers to common learner questions may help learners feel you are more connected to and responsive to them.

Basic Video Title	Better “Series” Video Title
The pluperfect tense	Answering Your Questions: Why use the pluperfect tense?

RECOMMENDATION: Create a set of videos with quick reviews of background content in which learners may be weak

Coursera’s mission is to provide universal access to the world’s best education. This implies a much more diverse learner demographic than is commonly addressed in traditional university settings. Instructors who create extra background videos give more learners the potential to engage in their course. Giving just enough of a review of necessary background material is helpful. These videos can be marked as optional.

Use multimedia research-informed strategies to help learners focus

There are a number of techniques specifically applicable to video lectures (compared to lecture hall lectures) which can increase the effectiveness of your video lectures (Mayer, 2009). The core theory behind these recommendations is that reducing extraneous things and focussing learner attention reduces the “cognitive load” associated with learning the material. In brief, the human brain has quite limited short-term memory capacity (DeLeeuw & Mayer, 2008) (Cowan, 2000). Videos should be developed to allow learners to devote all of that capacity to learning. The following recommendations are based around reducing unnecessary cognitive load.

RECOMMENDATION: Don’t read slides

Reading the exact text written is redundant -- and forces the learner brain to “expend extra effort trying to compare the incoming streams of printed and spoken text” (Mayer, 2009, pp 118). In general, keywords in conjunction with abbreviated text is better for video lecture slide design. Additionally, the complete text transcript of video lecture audio will be available to learners.

RECOMMENDATION: Use a combination of visual images and keywords on slides

“Humans possess separate channels for processing visual and auditory information.” (Mayer, 2009). While learners’ auditory channel will handle spoken words, learners can leverage their visual channel to connect appropriate images to spoken content. Review slides and compare the space devoted to the title, text, images, and instructor in the video. Keep things simple -- remembering that learners, as novices, will find cognitive load more of an issue than expert instructors. If needed, break content across two slides. Learners can easily rewind to review the previous slide.

RECOMMENDATION: Direct attention and label

Learners benefit from physical cues to focus their attention (Mayer, 2009, p108). Use arrows (or other attention directors) on slides or a dynamic writing system (e.g., Wacom Tablet) to direct learner attention to a specific part of a slide, diagram, graph, picture or chart. If appropriate, put the name of the item being discussed next to the arrow. These directors (if done clearly and consistently) are very valuable to learners searching through a video for a specific part (e.g., to review). Writing or other persistent images (arrows, text) are more easily reviewable than lecturer gesturing.

RECOMMENDATION: Leave complex diagrams, figures or graphs visible for a few extra seconds

More complex visual materials will take longer for learners to fully read or explore. Give learners a couple seconds of silence where they can focus on the diagram, figure or graph without also having to pay attention to spoken words. These pauses will also make key points clearer if learners are reviewing by fast forwarding through video.

RECOMMENDATION: Label “subgoals” in complex processes

Research shows that breaking up and placing names on appropriate “chunks” of a complex problem solving process helps learners be able to transfer the process to new problems (Margulieux, Catrambone & Guzdial). Instead of seeing an overwhelming number of problem solving steps, help learners focus on breaking the problem solving process into meaningfully-named parts. This reduces their cognitive load. Again, chunking and having meaningful names for parts of a process is a sign of expertise -- it is valuable to teach this skill to learners.

RECOMMENDATION: Explicitly share and explain thinking processes

Carefully planning to explain thinking processes in problem solving may be even more valuable on video than in the lecture hall. Learners struggling to understand a complex process can watch and rewatch video explanations, developing their understanding step-by-step. Don’t skip any steps in problem solving. Steps that instructors find obvious need to be spelled out for learners.

As learners become more expert, they hear explanations differently -- more like an expert. By explaining thinking verbally, learners have a model to follow as they approach a problem.

The next section provides more detail on increasing learner engagement in complex problem solving processes with in-video quizzes.

RECOMMENDATION: Create a summary slide

To reduce the effort required to find which video something was covered in and to support quick review, copy exact pieces (images, diagrams, definitions, formulas) from the video lecture onto one slide at the end. This slide should be useful in triggering memory of the main learning outcomes of the video.

Use Coursera's in-video quiz system

Coursera's platform can engage learners through questions posed during the video watching experience. These questions are inserted after uploading video, but instructors will want to plan for in-video quizzes while designing lecture.

RECOMMENDATION: Keep in-video questions short and relatively basic

A goal of in-video quiz questions is to keep learners engaged with video lecture. However, the exact opposite can happen if questions take a long time to answer, are overwhelming or otherwise make the learner feel there's no point in continuing to watch. Don't think of these as traditional summative test-full-knowledge questions -- the regular quiz system exists for that. In-video quizzes should serve encouragement and engagement purposes, such as the ones outlined below.

Create Community with Polls

Coursera's in-video quiz system offers features that not only help overcome the isolation of learners but can really draw out and leverage the large, international, and diverse learner body of the course.

RECOMMENDATION: Use a poll question to allow the class to share their views or experiences with each other. Include a poll question that leads into a topic on which you are about to lecture

Poll questions can be either radio button (one answer allowed) or checkbox style (multiple answers allowed). We suggest asking learners about their guess, expectations, or personal experience on something about to be explained. Examples might include:

- What do you think is the resource most constraining world population growth?
- In what area of the news have you recently seen a statistically-backed result of a study?

After learners answer, they will immediately be shown a histogram of the results from all learners who have already answered the question.

In addition to learners being able to feel more part of a community, research suggests they will be more interested and engaged with what you say next -- on that topic (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010, p. 82).

Support self-assessment of video lecture learning outcomes

RECOMMENDATION: Present 1-2 learning outcomes at the beginning of a video lecture

RECOMMENDATION: Create in-video quiz questions at the end of a video lecture to let learners test their understanding

Present 1-2 learning outcomes at the beginning of each video lecture -- things the learner should be able to do at the end of the video. This can be done through PPTs or other materials used in recording video lecture. Alternately, learning outcomes can be added when video is uploaded -- using the in-video quiz system's pause and reflect question (which doesn't require an answer). Enable students to self-assess their mastery of these outcomes by asking a question or two on them with an in-video-quiz at the end. These learning outcomes should contribute to the overall learning outcomes of the course.

RECOMMENDATION: Keep questions simple -- recall of EXACTLY what was said is best

While questions should allow learners to make sure they got the key points of the video lecture, they should be answerable just by watching the content of the video. They should not require integrating ideas or applying ideas beyond what was covered in the video. These questions can serve as a motivation to pay close attention when watching video. Tell learners what to look for, then let them experience the success of correctly answering questions on key content in the lecture.

A note about providing and testing learning outcomes (with the in-video quiz system): A great thing about doing this is that it supports the following recommended teaching practices:

- Give frequent, timely feedback (so learners can fix up their knowledge more quickly) (Bransford, et al., 2000, Chapter 1).
- Support student development of meta-cognition (knowing for themselves if they know something) (Bransford, et al., 2000, Chapter 1).
- Support a "growth mindset" (belief that they can learn new, hard things) (Dweck).
- Support "retrieval practice" (having the brain practice remembering something) (Roediger & Karpicke, 2006).

Help learners build on pre-existing knowledge

RECOMMENDATION: Ask a question which engages learners in recalling things they already know that are relevant to what will next be taught.

Learners form and integrate new knowledge and understanding by building on things they already know (Bransford et., al., Chapter 1). Learners can more easily integrate new material into long-term memory when they recall prior knowledge right before being exposed to new information.

These recall questions could be factual - where there is a right or wrong answer. Another option is to use a poll question (no specific correct answer) which may be more appropriate for the diverse MOOC learner demographic.

Examples:

- (Poll Question) From your previous experience, is the Mongol empire considered a
 - A) positive force
 - B) negative force
- (Poll Question - even though there might be answers that are better than others) The term "limit" is used differently in general speech than in math, which of the following do you most associate with the non-mathematical term "limit"?
 - A) a speed limit
 - B) a constraint that keeps you from doing something...
- (Check all that apply -- there are correct answers) Which of the following objects has a "depth"?
 - A) circle
 - B) sphere
 - C) square
 - D) shoe box

Support engagement with problem solving

RECOMMENDATION: Ask learners the next step in a problem solving process, before showing it

RECOMMENDATION: Ask learners to predict something about to be drawn about to be pointed to in a figure/graph

RECOMMENDATION: Ask learners to identify an error in a solution, before it is pointed out and corrected

In various settings, ask learners to predict or anticipate the next step.

Examples:

- What should I fill in for g ?
- What part(s) of the picture best exemplify cubism?
- Is the result greater or lesser than before?

Often these might be the kinds of rhetorical questions instructors ask in class.

Getting started recording video lectures

Besides issues of video production, there are issues of content and style that have positive impact on learner engagement.

Share your passion with learners

The physical instructor-learner meeting in the lecture hall matters a surprising amount in terms of helping learners form a human-to-human connection with the instructor. Research shows that learners will pay more attention to and try harder to understand someone they feel they have a relationship with (Mayer, 2009, Chapter 13).

This can be addressed in video lectures simply by making the goal of connecting with learners more explicit in video lectures than is common in the lecture hall. Techniques to consider include:

RECOMMENDATION: Create a welcome video for the course

This video should be an invitation to participate in the course. Rather than reviewing a list of content, instructors should share their passion for the subject and excitement about what learners will get out of the course. We recommend that this be a high production video and be filmed focussing on the instructor (not just slides). Consider a special location (a lab, outdoors on campus, a workplace related to the course, etc.)

RECOMMENDATION: Create an introductory video for each module or section

Use this video to motivate the goals and material to be covered. Share personal experiences of how this is used in research or professionally in the field, how it can be used in the real world, and/or reflections on the instructor's own experience when learning this material. Make clear what value learners will get if they continue on in this next module.

RECOMMENDATION: Speak more directly to learners

Use first person words like "you" and "I" (rather than third person, "one would") to help learners develop more of a sense of personal connection. This might be missing from not being in the classroom with the instructor (Mayer, 2009, Chapter 13).

RECOMMENDATION: Stand up, or otherwise replicate common lecture hall physical behavior.

RECOMMENDATION: Put up pictures of students or mentally imagine a common lecture space before recording each video.

Instructors are expected to be experts in their field and to be able to explain new and complex content to learners. This is more important than performing as a spotless “actor”. This isn’t to say lectures shouldn’t be carefully planned (possibly including scripting text). But, even in front of a camera, lecture and speak to learners. Instructors reading prepared materials can become more monotone and stilted than they are when standing in front of students.

RECOMMENDATION: Practice any dynamic writing and plan use of space

Especially if used to working with large sets of blackboards, pre-plan any dynamic writing to allow for plenty of space, to use labels, and to have logically segmented parts.

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