

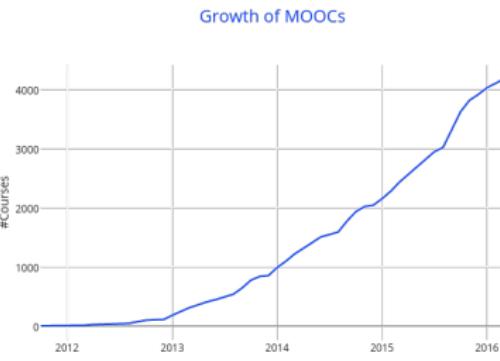
Merits of Online Education

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(12s) Okay, so today I'm gonna talk about the topic of online education. And here my argument is that the online education is better than the traditional classroom education, so I'm gonna focus more *on its* merits.

Massive Open Online Course (MOOC)



MOOC

- Reduces the cost of education
- Broadens access to education
- Leads to better academic performance

(41s) In the last few years, there has been a great proliferation in MOOCs, which are also known as massive open online courses.

These courses are provided by several different platforms, such as edX, Coursera and Udacity. They offer all kinds of courses from top universities like Stanford and MIT.

So that these university subjects become available and free of charge to anyone on the internet.

Currently, there are 3 major merits of MOOCs. That is, it cuts down the **cost of** education, it broadens access to education, and it leads to better academic performance.

Reduction in the Cost of Education

Virtual classrooms



First of all, when it comes to online education, there's no need for classrooms or seats in'em. So the expense can be saved, and won't be passed to students any more. Also there's no need to worry about capacity of classrooms, *because* there are no limits of seats in virtual university.

Reduction in the Cost of Education Open Educational Resources (ORE)



And moreover, textbooks are free to students. By using open educational resources, or some other free material offered by professors, students don't have to buy textbooks, which are usually at very high prices.

Reduction in the Cost of Education

Peer-to-peer Learning



Finally, peer-to-peer learning can be applied in online education. Students from all over the world can interact and study together. They can even grade each other's homework. So that professors don't need to grade all the assignments by themselves, which can save'm a lot of time.

Broad Access to Education

Coursera



Machine Learning

Andrew Ng

Class starts February 2012



The Machine Learning class offered by Andrew Ng:

- 400 people enrolled every time it's offered
- 100,000 people registered when it's taught to the public

Hence, Andrew and his colleague formed Coursera.

(43s) Because MOOCs can be accessed by anyone on the internet, it makes education more available than ever before.

[Let's take the Machine Learning class by Andrew Ng for example.](#)

Every time the course was offered in Stanford, about 400 students would enroll. And this already makes the Machine Learning course one of the biggest in Stanford. But when Andrew taught this course to the public for the first time, about 100 thousand people registered for it, which is nearly 250 times more. So, having seen the impact of this, Andrew and his colleague decided that they needed to scale this up. So they formed Coursera, to bring top-quality education to as many people as they could.

Better Academic Performance



Key ideas: active learning, self-pacing, and instant feedback.

(44s) And it also turns out, MOOCs can lead to better academic performance.

There was once a pilot course in San Jose State University. It was a hard course about circuits and electronics. The course was designed to be a blended one. That is, the students first watched videos and did interactive exercise online, and then they came to classrooms to discuss with classmates and professors. As it was a hard course, the failure rate of it used to be about 40 to 41 percent. But with this blended class, the failure rate fell to 9 percent. So the result was extremely good.

And speaking of the reasons for this, there are three key ideas that make all of this work.

Better Academic Performance

Active Learning

[1] Craik, F.I. and Lockhart, R.S., 1972. Levels of processing: A framework for memory research.

Journal of verbal learning and verbal behavior, 11(6), pp.671-684.

The image shows a composite screenshot of a course management system. On the left, a video player displays a lecture titled "AUTOSOMAL DOMINANT INHERITANCE" featuring a man in a blue shirt. The video progress bar shows 0:18 / 10:25. On the right, a separate window shows an interactive exercise titled "LECTURE 8: TEST YOURSELF". It asks, "Which set of individuals excludes autosomal dominant inheritance for this pedigree? Choose from the list below." Below the question is a pedigree chart with three generations. Generation I consists of a black female (1) and a white male (2). They have four children: a white female (3), a white male (4), a white female (5), and a black male (6). Generation II consists of white males (7, 8, 9, 10) and white females (11, 12). Generation III consists of white males (13, 14, 15, 16) and white females (17, 18). The exercise lists several options for selection:

- 1, 2, 3, 5, 6, 7
- 3, 4, 9, 10, 11, 12
- 7, 8, 13, 14, 15, 16

(23s) The first one is active learning.

Each lesson of this course is a sequence of videos and interactive exercise. So a student may watch a five- or seven-minute video and follow that with an interactive exercise.

This form of learning is called active learning. And according to the research, students learn much better when they are interacting with the material in this way.

Better Academic Performance

Self-pacing

SBV5: ANOTHER DEPENDENT SOURCE EXAMPLE

Another dependent source example

shown here.

So the equations say that if V_{IN} is less than 1 volt, then the current is 0. But if V_{IN} greater than one 1, then the current I_D through this current source relates to the voltage V_{IN} K divided by 2 times V_{IN} minus 1 the whole squared. It's a nonlinear voltage-controlled current source, but the current is related to the square of the input voltage.

Download video [here](#).

More information given in the text.

Lecture Slides Handout [Clean] [Annotated]

Show Discussion

(27s) The second idea is self-pacing.

When having classes in classrooms, students may not be concentrated all the time. For example when they are taking notes, they may lose the professor. And if the class is a hard one, they may even lose the lecture for the rest of the hour.

But when they are watching video lectures, they can pause the video when they're taking notes. Or they can even rewind the professor in case they don't understand. So this form of self-pacing can be very helpful to learning.

Better Academic Performance

Instant Feedback

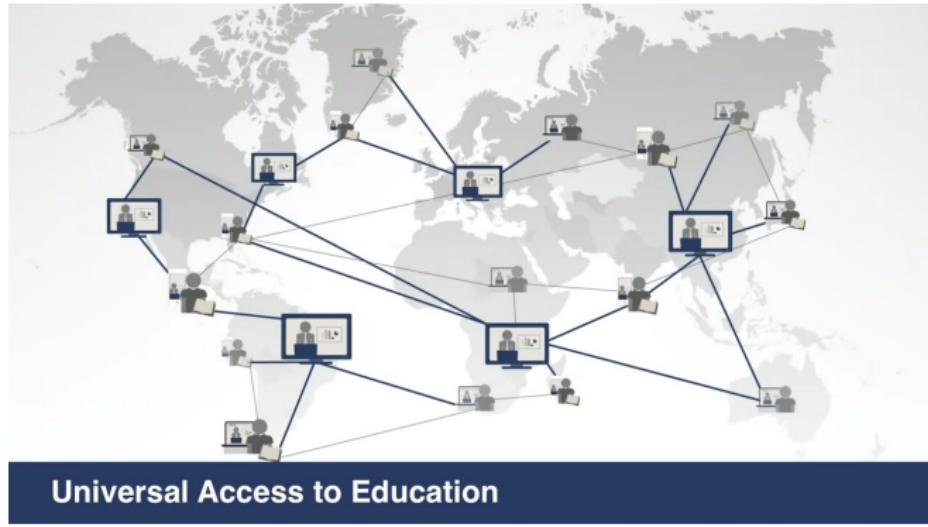
A screenshot of a digital learning platform. On the left, a sidebar lists course modules: Overview, Week 1 (Why Solid-State Chemistry?, Modern Chemical Concepts and Periodicity of the Elements, The Electron and Light), Additional Study Material (Problem Set 1, due October 28), Week 2, Week 3, Week 4, Exam 1, Week 5, and Week 6. The main content area shows a problem set titled "H1P2: DECOMPOSITION OF AMMONIUM NITRATE". It describes the decomposition of ammonium nitrate: $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + 2\text{H}_2\text{O}$. Two questions are listed: (a) Write a balanced chemical equation, with the student's answer $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + 2\text{H}_2\text{O}$ marked as correct; (b) Calculate the number of grams of H_2O produced by the decomposition of 0.10 mole of ammonium nitrate, with the student's answer marked as incorrect. A large green checkmark is overlaid on the interface, pointing towards the correct answer.

(33s) The third idea is instant feedback.

In traditional classroom courses, it takes a really long time to grade all of the homework. Students may have forgotten all about it when their grades come back. And some of the homework may be not even graded ever.

But with instant feedback, the computer grades all of the assignments. So students can try to apply their answers. If they get it wrong, they can get feedback at once. So that they can try it over and over again before they find the right answer. This would make the learning process much more engaging, and hence make students learn it better.

Conclusions



The expanding top-quality online education will

- Make education a fundamental human right
- Make lifelong learning possible
- Enable a wave of innovation

(40s) So based on all of these arguments, the online education could be really promising. If high-quality education could be offered to everyone around the world for free, a lot of good things might happen.

First, because anyone with the ability and motivation to learn can get the skills they need, it'll make education a fundamental human right.

Second, as people are able to learn new things every time they want, it'll make lifelong learning possible.

And finally, because talented people always have access to high-quality education no matter where they are, they'll be able to come up with great ideas and contribute to worldwide innovation.

