

Impact of open education to improve student outcomes around campus community

Katsusuke Shigeta

Associate Professor, Information Initiative Center

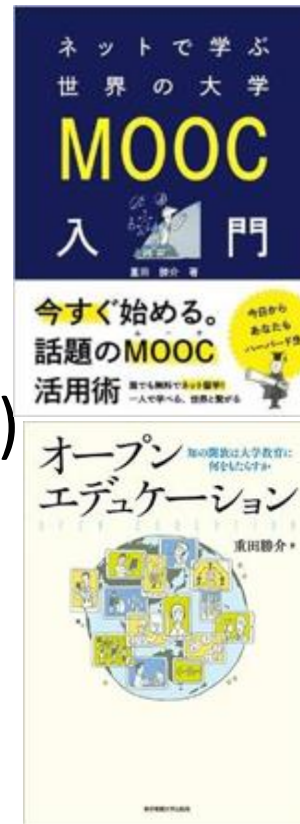
Associate Director, Center for Open Education

Hokkaido University JAPAN

shige@iic.hokudai.ac.jp

Katsusuke Shigeta

- Ph.D. at Osaka University (Human Sciences)
- A researcher conducting open education and educational technology
- Open MOOC in Japan 2014
 - “Open education and future of learning”
 - 7000+ enrollments, 1400 certificates
 - Introduce flipped classroom (50 participants)
- Publications (Japanese)
 - Open Education
 - Introduction of MOOC



Overview

1. “Open Education” Movement

Activities to open learning materials and opportunity

2. The feature of MOOC

MOOC as a “evolution” of open education

3. MOOC and Higher Education

Future possibility of MOOC, HE, and Society

4. Open Education at universities in Hokkaido

Share liberal arts education by SPOC and MOOC

1. “Open Education” Movement

Activities to open learning materials and opportunity

2. The feature of MOOC

MOOC as a “evolution” of open education

3. MOOC and Higher Education

Future possibility of MOOC, HE, and Society

4. Open Education at universities in Hokkaido

Share liberal arts education utilizing MOOC

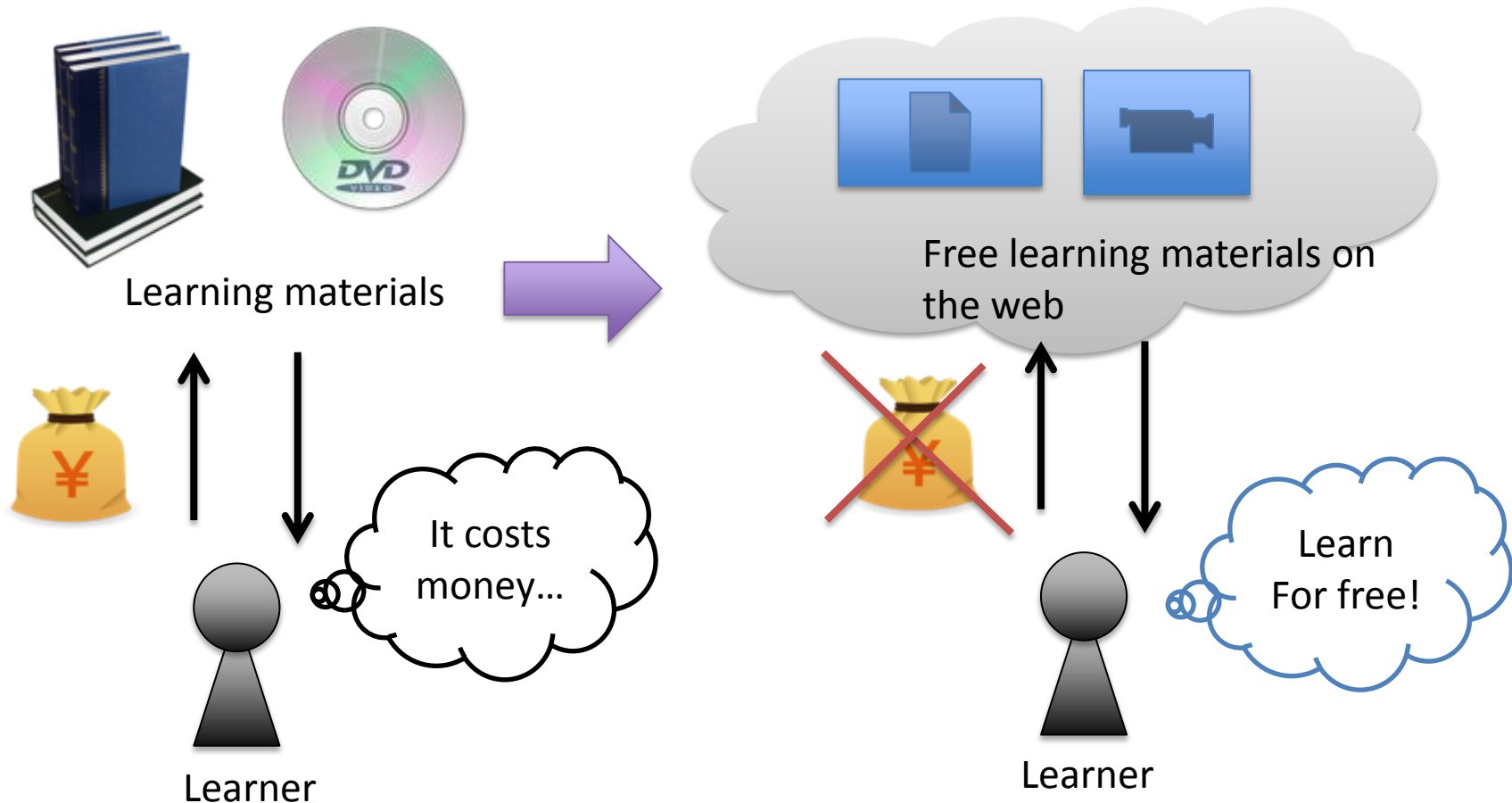
About Open Education

- What is “open education”?
 - “Open up” education to increase opportunity to learn
 - Everyone participates teaching and learning
 - Supported by society (government and foundation)
- Beginning of open education
 - 1990s : dissemination of e-learning
 - Failure of paid learning materials by universities
 - 2001 : OpenCourseWare founded by MIT
 - Open learning materials for free by universities
 - Spread of Open Educational Resources (OER)

Feature of open education (1)

Freely available learning materials

- Open free textbooks and videos online



OER (Open Educational Resources)

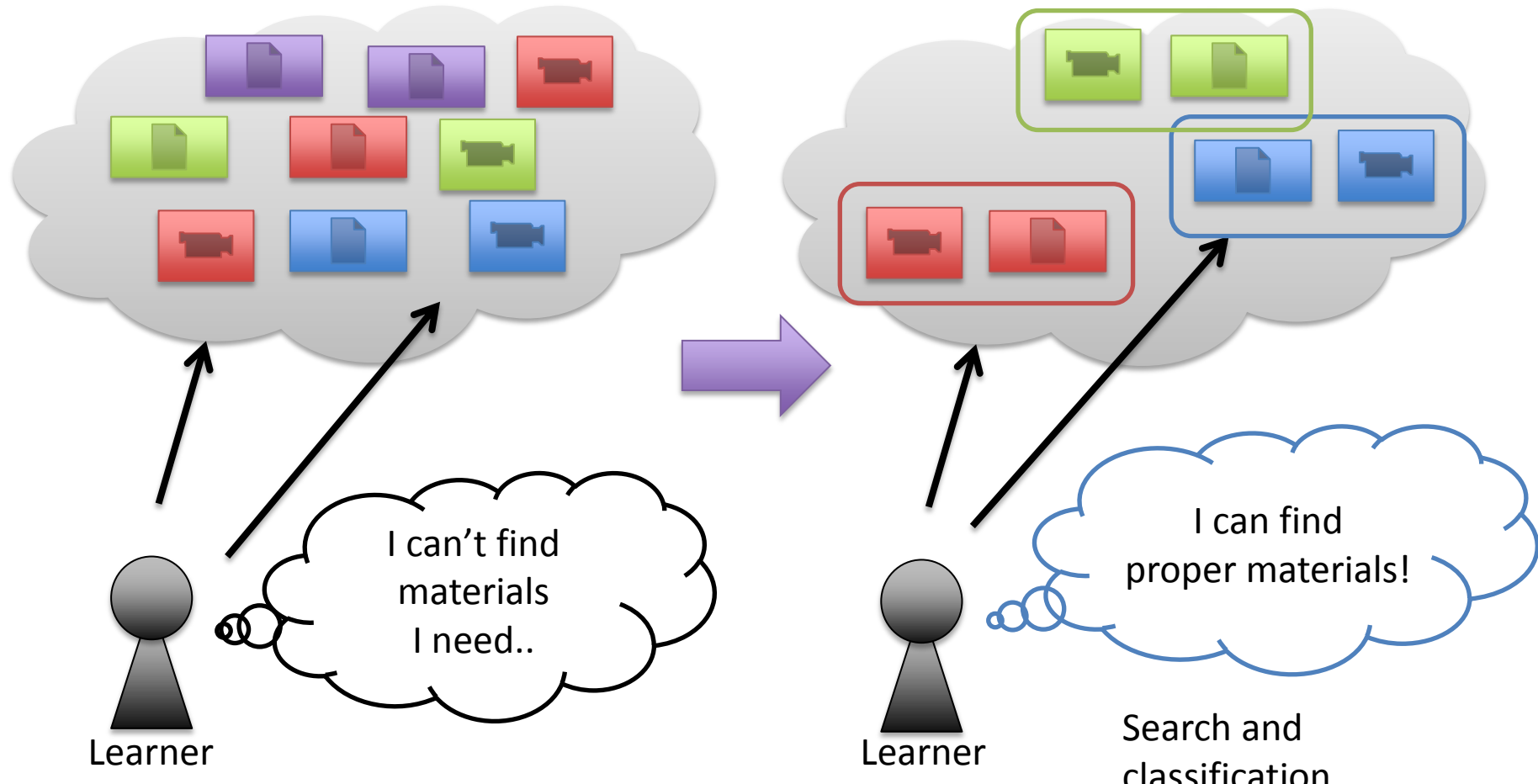
- Learning materials freely available on the web
 - Textbook, lecture movies, etc.
- Reuse to enlarge quantity and diversity
 - Application of Creative commons license
- Dissemination by international movement
 - UNESCO 2012 declaration for “OER congress”
- Open Textbook
 - Replace existing publisher textbooks
 - Reduce costs for students



Feature of open education (2)

Establish websites for learning materials

- Find appropriate materials for purpose



OpenCourseWare (OCW)

- Freely available lecture materials by universities
- Worldwide efforts
 - Regional and worldwide consortiums
- Translation of materials to local language

The screenshot displays the MIT OpenCourseWare website interface. At the top, there is a navigation bar with the MIT OpenCourseWare logo and links for 'Subscribe to the OCW Newsletter', 'Enter Email', 'Subscribe', and social media icons for Facebook and Twitter. Below this is a secondary navigation bar with 'Home', 'Courses', 'About', 'Donate', 'Featured Sites', a search bar, and 'Advanced Search'. The main content area is titled 'Biochemistry' and includes a breadcrumb trail: 'Home > Courses > Biology > Fundamentals of Biology > Biochemistry'. A red banner below the title reads 'OCW Scholar' with 'Previous' and 'Next' navigation arrows. On the left, a sidebar lists course topics: SYLLABUS, BIOCHEMISTRY (with sub-topics like Types of Organisms, Covalent Bonds, Macromolecules, Proteins, Biochemical Reactions, Respiration, and Chemiosmotic Principles), and EXAM 1. The main content area features a diagram of a T Cell Receptor embedded in a membrane, showing its Alpha and Beta chains with Variable and Constant regions. To the right of the diagram is a detailed text description of the course unit, covering topics from the organization of life to the Calvin Cycle in photosynthesis.

Biochemistry

Home > Courses > Biology > Fundamentals of Biology > Biochemistry

OCW Scholar

« Previous | Next »

BIOCHEMISTRY

Types of Organisms, Cell Composition

Covalent Bonds, Hydrogen Bonds

Macromolecules, Lipids, Carbohydrates, Nucleic Acid

Proteins, Levels of Structure, Non-covalent Forces

Biochemical Reactions, Enzymes and ATP

Respiration and Fermentation

Chemiosmotic Principle, Photosynthesis

EXAM 1

Alpha Chain NH_2

Beta Chain NH_2

Variable Region

Constant Region

Membrane

Outside

Inside

T Cell Receptor

This unit will introduce the course and cover the basics of biochemistry and cell composition. First, we will introduce the levels of organization of life, and the different types of organisms. We will then cover the structure of biological molecules and the molecular forces involved in the formation of these molecules. We will learn about the general structure and function of lipids, carbohydrates, and nucleic acids, as well as the composition, structure, and function of proteins. After learning about the major groups of macromolecules, we will explore their interactions within a cell, starting with metabolism, Gibbs free energy, biochemical reactions, enzymes and ATP as the energy currency. We will outline the cellular mechanisms for harvesting energy from glucose and related sugars, briefly outline glycolysis as a mechanism to generate ATP, and discuss the fate of the pyruvate produced in glycolysis under anaerobic and aerobic conditions. Finally, we will cover the general ideas of both cyclic and non-cyclic photophosphorylation and how these two processes are used by cells to generate the ATP and the NADPH needed for the Calvin Cycle in photosynthesis.

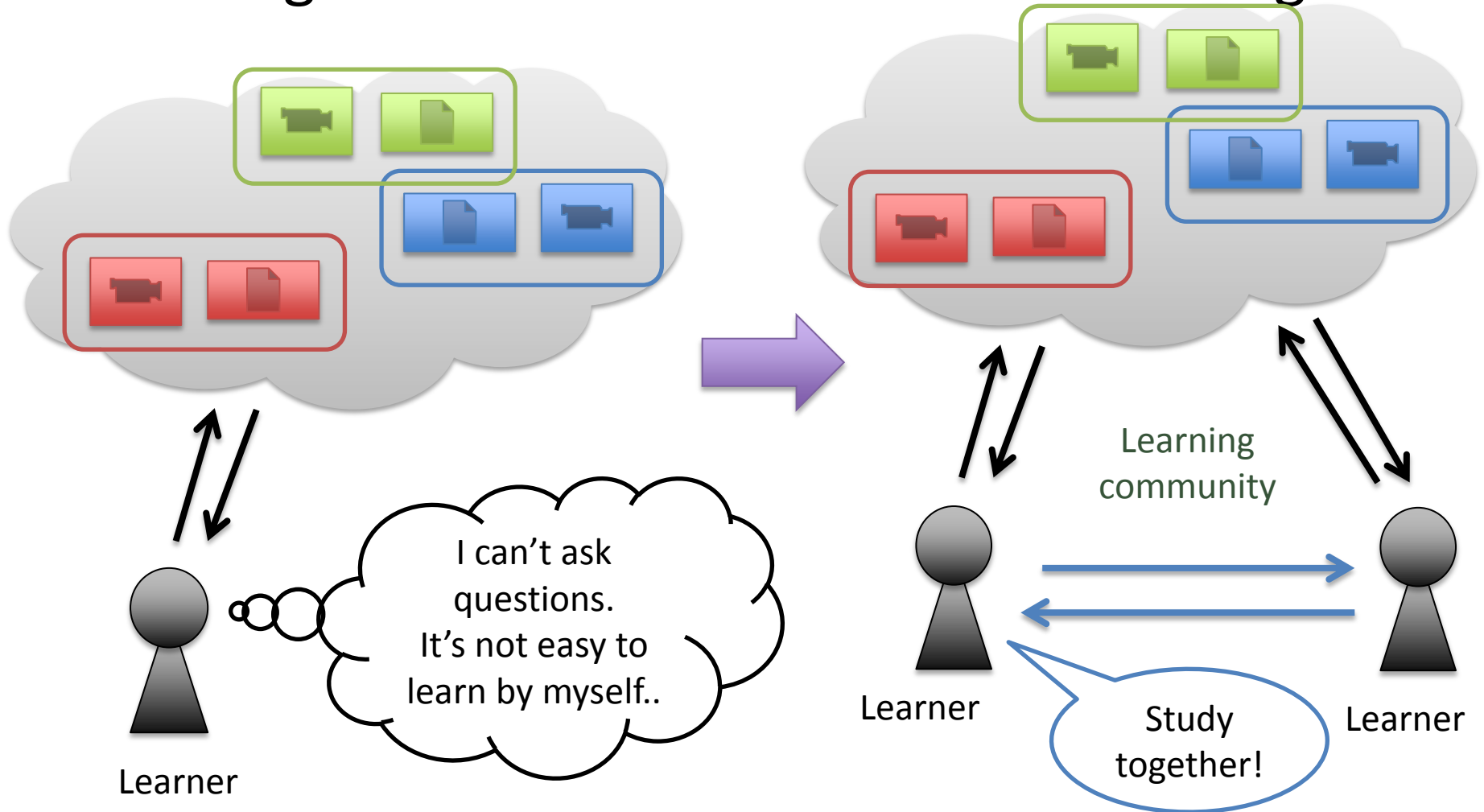
During this unit, you will describe both the chemical and molecular composition of a cell, and define the basic components of biological macromolecules. You will identify the forces that act in biological systems: covalent bonds, ionic bonds, hydrogen bonds, van der Waal's forces, and hydrophobicity. You will draw a generic amino acid and categorize each of the 20 amino acids appropriately based upon the nature of the side chain. You will also apply the general laws of thermodynamics to biological reactions. In addition, you will define Gibbs free energy, determine the Gibbs free energy change associated with a biochemical reaction, and identify spontaneous and non-spontaneous reactions.

At the end of this unit, you will be familiar with the different levels of organization of life, and the differences between eukaryotic and prokaryotic cells. You will understand the structures and properties of the major groups of macromolecules, including lipids and phospholipids, carbohydrates nucleic acids, and proteins, as well as their functions in the cell. You will be familiar with primary, secondary, tertiary, and quaternary levels of protein structure and know what types of bonds and forces stabilize each level. In addition, you will understand the effect of an amino acid substitution on the general structure and function of a protein. You will know how ATP provides the energy to power cellular work.

Feature of open education (3)

Establish learning community

- Encourage motivation and effects of learning



OpenStydy



- Online learning community
- Use OCW to learn together

Mozilla Open Badge



- Issue “digital badge” for accomplishment of learning
- Signaling for knowledge skills

1. “Open Education” Movement

Activities to open learning materials and opportunity

2. The feature of MOOC

MOOC as a “evolution” of open education

3. MOOC and Higher Education

Future possibility of MOOC, HE, and Society

4. Open Education at universities in Hokkaido

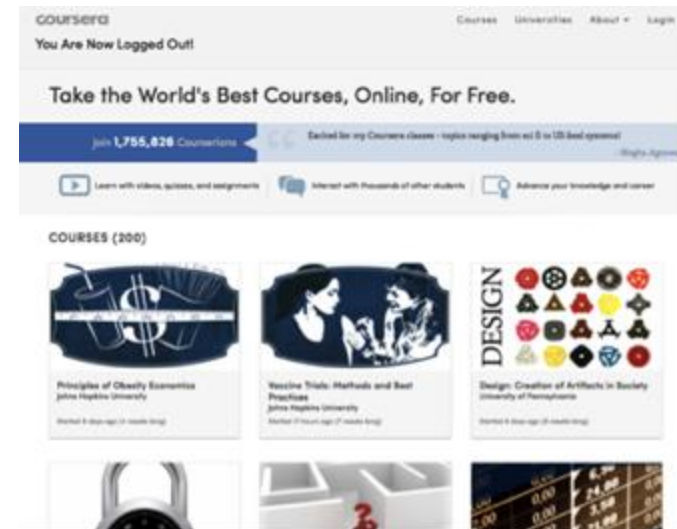
Share liberal arts education utilizing MOOC

What is MOOC?

- Massive(ly) Open Online Course
- Provide opportunity to take courses in public
 - Duration: Several weeks to months
 - Not only open materials, but also provide learning environment
- Massively participation for free
 - Learning community around the world
- Emerge MOOC providers and consortiums
 - Around the US and Europe from 2012

Coursera

- Education company that partners with top universities and organizations to offer courses
 - Established 2012 by faculty at Stanford University
- Over 500 courses by over 100 universities
 - Humanities, medicine, biology
 - Social Science, mathematics
- Over 13 million enrollment
- Offered by multiple language
- Funded by over \$60 million



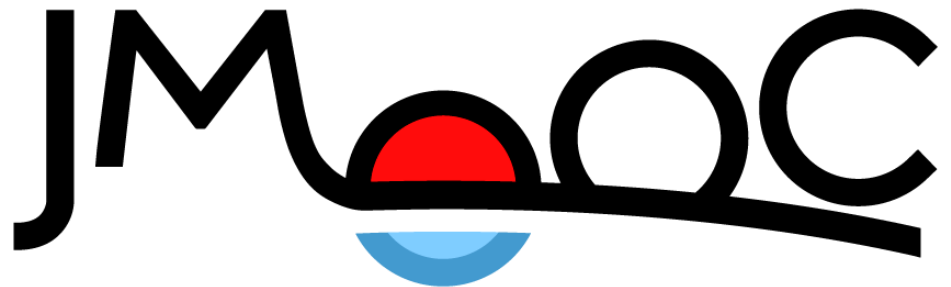
edX

- University consortium offer MOOC
 - Established 2012 by MIT and Harvard
 - Each contributed \$30 million
- 43 universities offer university-level courses
- Over 5 million enrollment
- Open-source platform (Open edX)



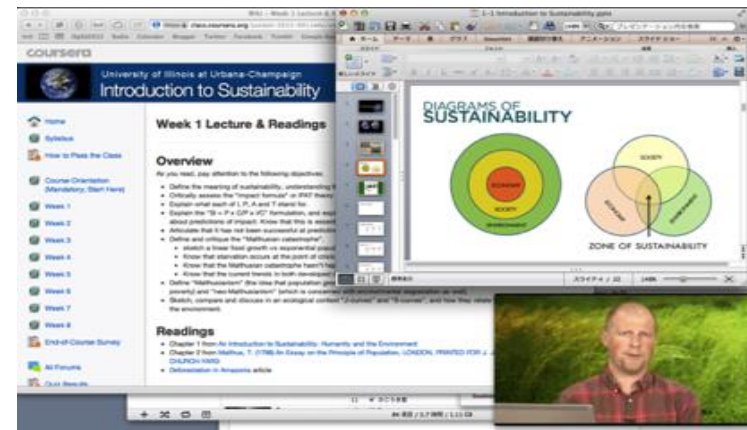
JMOOC

- Japan Massive Open Online Course
 - Collaboration with industries and universities
- Multiple MOOC providers
- Started April 2014, over 30 courses
- Over 150 thousands enrollments



Courses on MOOC

- Subject
 - Introduction courses for undergraduates
 - Distinctive courses (Development of Robot car etc.)
- Structure
 - E-learning courses with community
 - Sequential materials with video, text and quizzes
 - Peer-review of essay
 - Discussion Forum
- Issue certificate, not credit



Feature of MOOC compared to e-learning

- Differences between existing “e-learning”
 - Free to enroll, voluntary participation
 - No charge (No fee and no tuition)
 - No credits
 - Completion of course is not required (10%)
- Worldwide learning community
 - Millions of participants
 - “Meetup” events
 - meet neighboring participants organized worldwide



2893 Coursera communities

NEAR TOKYO, JAPAN

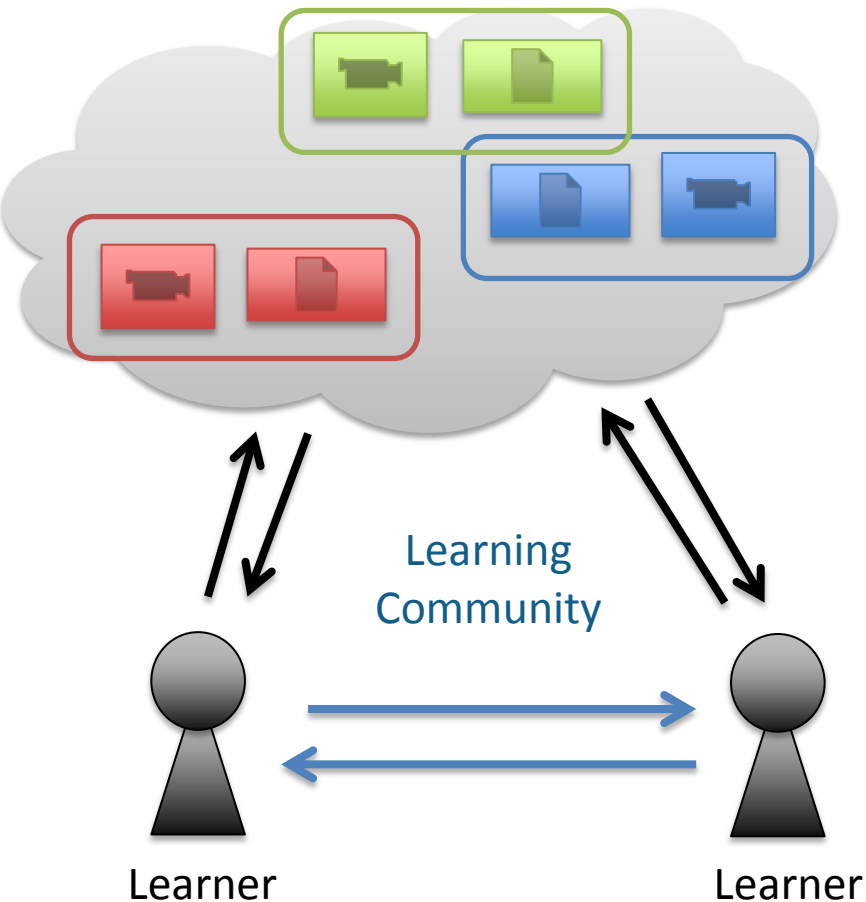
Tokyo
117 Courserians

Check out
our next Meetup

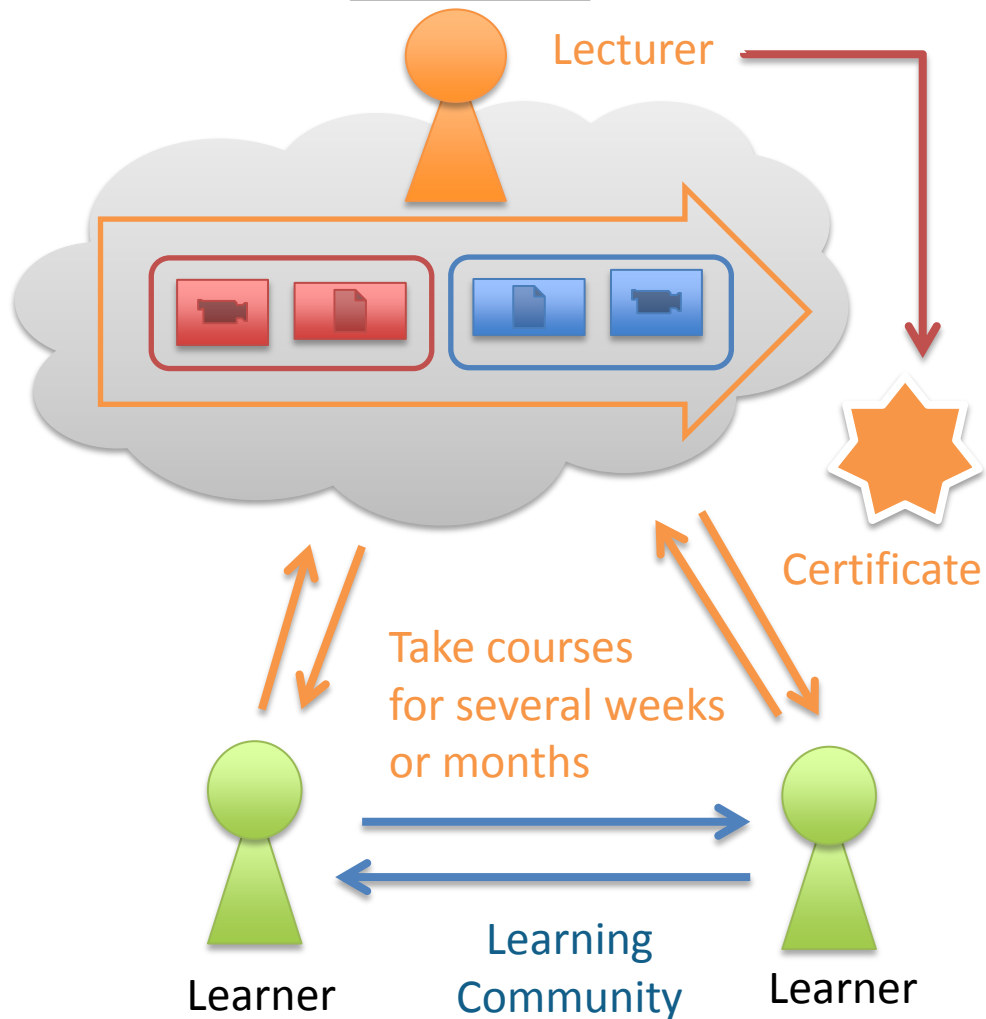
Top Meetup planners

MOOC as a “learning service” by open online courses

Learning Community using OER



MOOCs



1. “Open Education” Movement

Activities to open learning materials and opportunity

2. The feature of MOOC

MOOC as a “evolution” of open education

3. MOOC and Higher Education

Future possibility of MOOC, HE, and Society

4. Open Education at universities in Hokkaido

Share liberal arts education utilizing MOOC

Backgrounds of open education activities by universities

- Ideal Aspects
 - Increase educational opportunities in global terms
 - International relief efforts to equal opportunity of education (translation of OER)
- Pragmatic Aspects
 - Provide return to universities
 - Increase publicity to open OCW and MOOC
 - MIT: 27% beginning students aware of OCW before deciding to attend MIT were influenced by it
 - Reduce costs (introduce Open Textbooks)

Using MOOC on campus

- Introduction of MOOC as “digital textbooks”
 - Flipped classroom or blended learning
 - Improvement of retention rate
 - From 50% to 90%
 - SPOC(Small Private Online Courses)
 - Use MOOC privately inside campus
- Online graduate school using MOOC
 - Georgia Tech Univ. Master of computer science
 - Collaborate with MOOC provider (Udacity)
 - \$7000 for master degree

Verified certificate to credit

- “Signature Track” by Coursera (around 20 USD)
 - Identification procedure by Photo ID using webcam
 - Prevent plagiarism by key typing recognition
- Get credit by verified certificate
 - ACE Credit (Credit recommendation service)
 - Transferred to ACE Credit to be used for academic credit
 - Used as complement of credit on existing university



Criticisms and concern

- Criticism

- Integration of MOOC in traditional university setting exist

- Rapid introduction of MOOC on campus restrict academic freedom of faculty and university

- Concern over sustainability

- Remains unsure (funding depends on VC)

- Developing a sustainable business model is essential

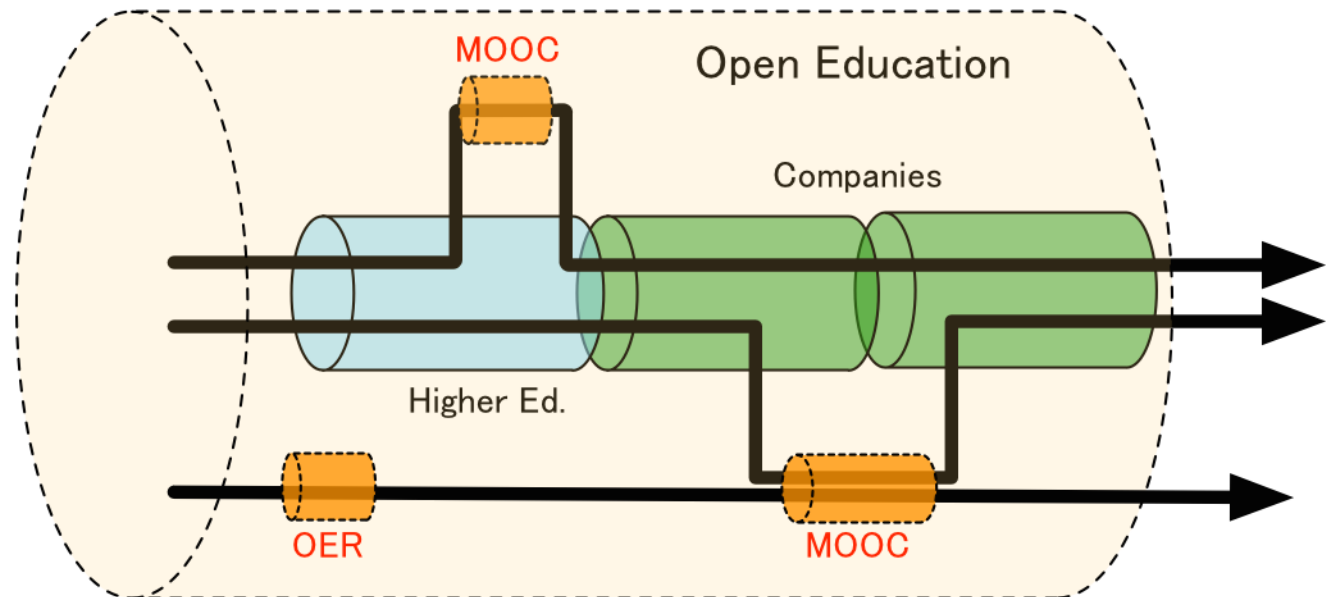
- Crucial for universities to measure the efficacy

MOOC and higher education

- Improve online learning by MOOC
 - Using “big data” from “massively” participants
 - Improve online courses by learner’s behavior
- Potential of MOOC by private sector
 - For workplace learning (Yahoo! and Coursera)
 - Open Education Alliance
 - Udacity and IT(Google, AT&T) companies jointly established
 - Reduce skill gaps through online education to develop human resources on IT industry
- Government support (US) for teacher education

MOOC as a social infrastructure of learning

- Offer learning opportunities in diverse ways
 - Support workers and learners to expand social safety net to increase employment opportunities
 - Add existing education system to opportunity to learn



1. “Open Education” Movement

Activities to open learning materials and opportunity

2. The feature of MOOC

MOOC as a “evolution” of open education

3. MOOC and Higher Education

Future possibility of MOOC, HE, and Society

4. Open Education at universities in Hokkaido

Share liberal arts education utilizing MOOC

Center for Open Education



北海道大学
オープンエデュケーション
センター
CENTER FOR OPEN EDUCATION
HOKKAIDO UNIVERSITY

- University-wide organization
 - Under the Institute for the Advancement of Higher Education
- Objectives
 - Supporting teaching and learning using OER
 - OER research and development
- Unification of initiatives on campus
 - Hokkaido University OCW office
 - E-learning efforts on several departments

Backgrounds: Challenges in Hokkaido area

- Potential to realize diverse liberal arts education for cooperation of universities in Hokkaido
 - Specializing single-department universities (agriculture, engineering)
- Difficulty to support variety of liberal arts education on each universities
 - Limited faculty for second language courses
- Opportunities for students to learn diverse courses
 - Utilize distinctive features of universities

Cooperation of universities in Hokkaido

- Utilize distance learning
 - Videoconferencing system
 - Special classroom for active learning
- Improve student outcomes
 - Overcoming challenges to increase effectiveness of distance learning



18th century



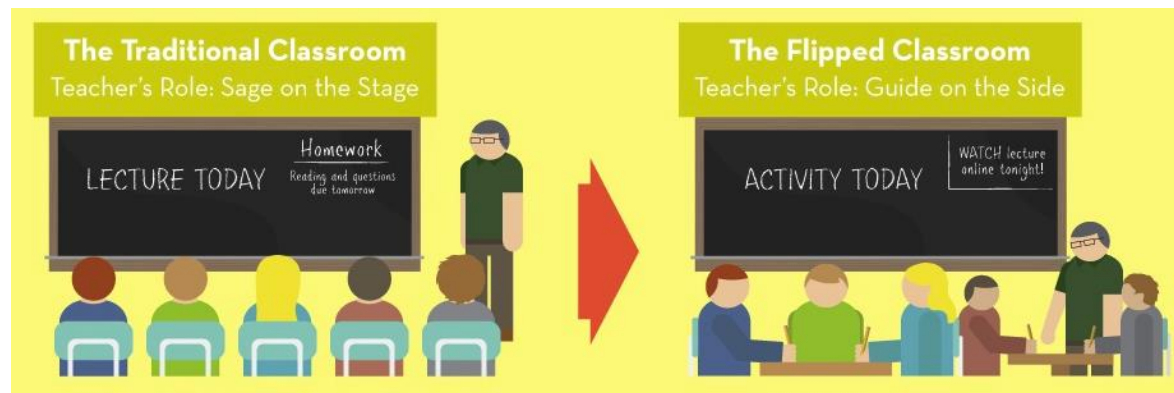
20th century



21st century

Improve learning outcomes using OER

- Flipped classroom
 - Using learning materials for preparation
 - Activity to “use” knowledge in classroom
 - Improving student outcomes and reduce the drop-out rate

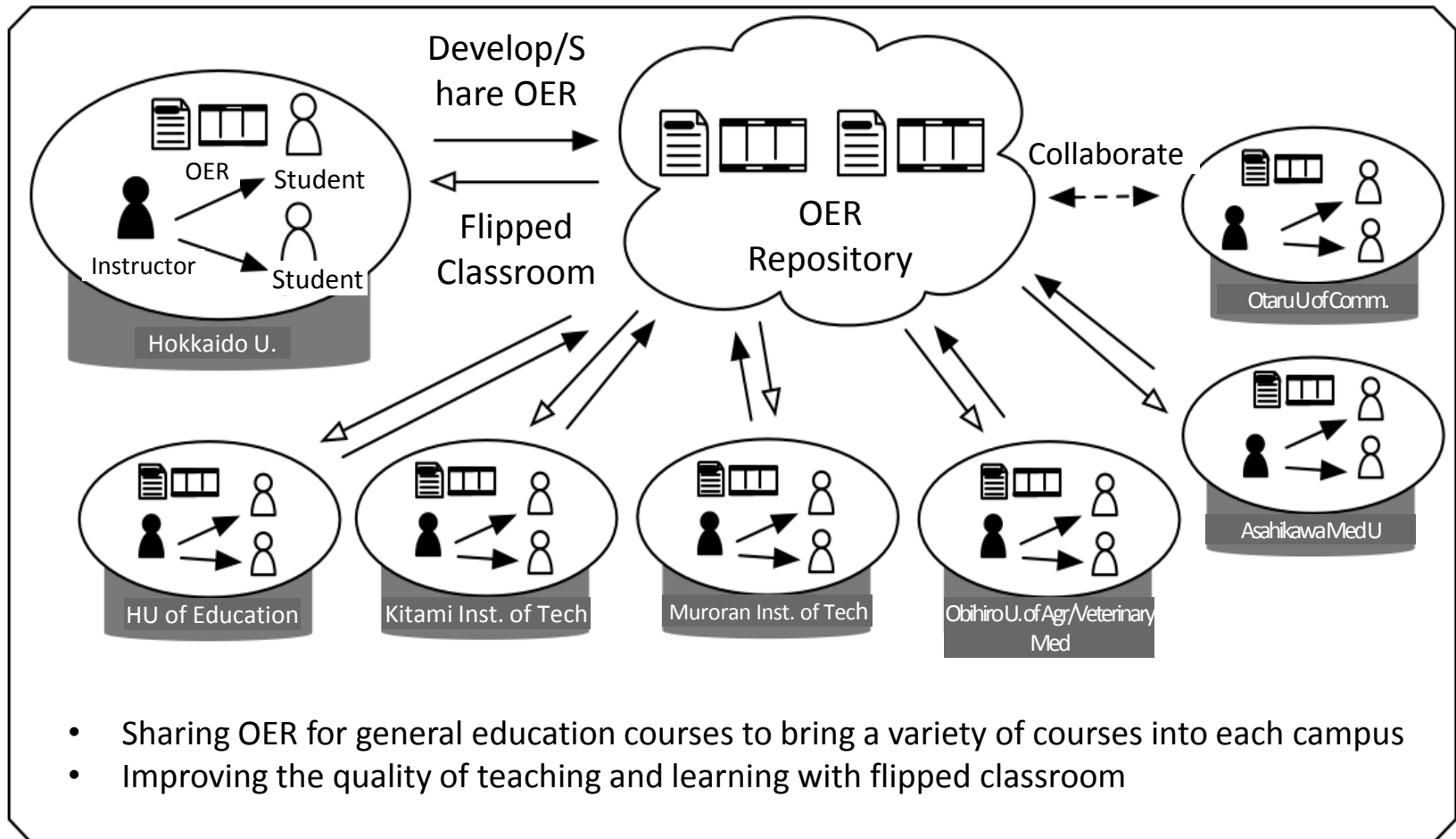


The Flipped Classroom: Turning the Traditional Classroom on its Head - <http://www.knewton.com/flipped-classroom/>

Activities (1)

- Create “OER Repository” to share learning materials
 - Videos, texts, e-textbooks, quizzes...etc.
 - On Open edX platform (localization)
 - Create model courses
(4 courses / year)

Activities (1)



Activities (2)

- Develop OER
 - Applied ethics, Earth and space science, Digital Literacy, Environmental radioactivity
- Some OER are based on existing OER
 - Open Learning Initiative (Carnegie Mellon U.)
- Pilot courses from 2nd semester in 2014
 - Flipped classroom and active learning
- Credit bearing courses starting since 2015
 - Applied ethics/Digital Literacy

Designing OER

- “MOOC-type” learning materials
 - Short videos + quizzes
 - Structured materials developed based on instructional design
- Experts
 - Instructional designers
 - Video producers
 - Copyright clearance
 - Open license (CC-BY-NC)

何か必要か？

Clip2: good things and bad things

Slides:

- animation: name
- introducing an example
- focusing on the lower part of the example

Slide

Good things and bad things

- 善いこと (goodness) と正しいこと (rightness) は重複する部分も多いが、必ずしも常に一致するわけではない。
- 例: カンニング
成績優秀な学生が、落第しそうなお友人にテストの答えを教える... 友人を助けることは一般的に賞賛され、その人の賞賛として善いことであり賞賛される行為であるが、その賞賛さしに由来する特定の行為が必ずしも正しいこととは限らない。

Answer

OER Repository

- Academic Commons For Education (ACE)
 - Open since April 2014
- Based on Open edX platform



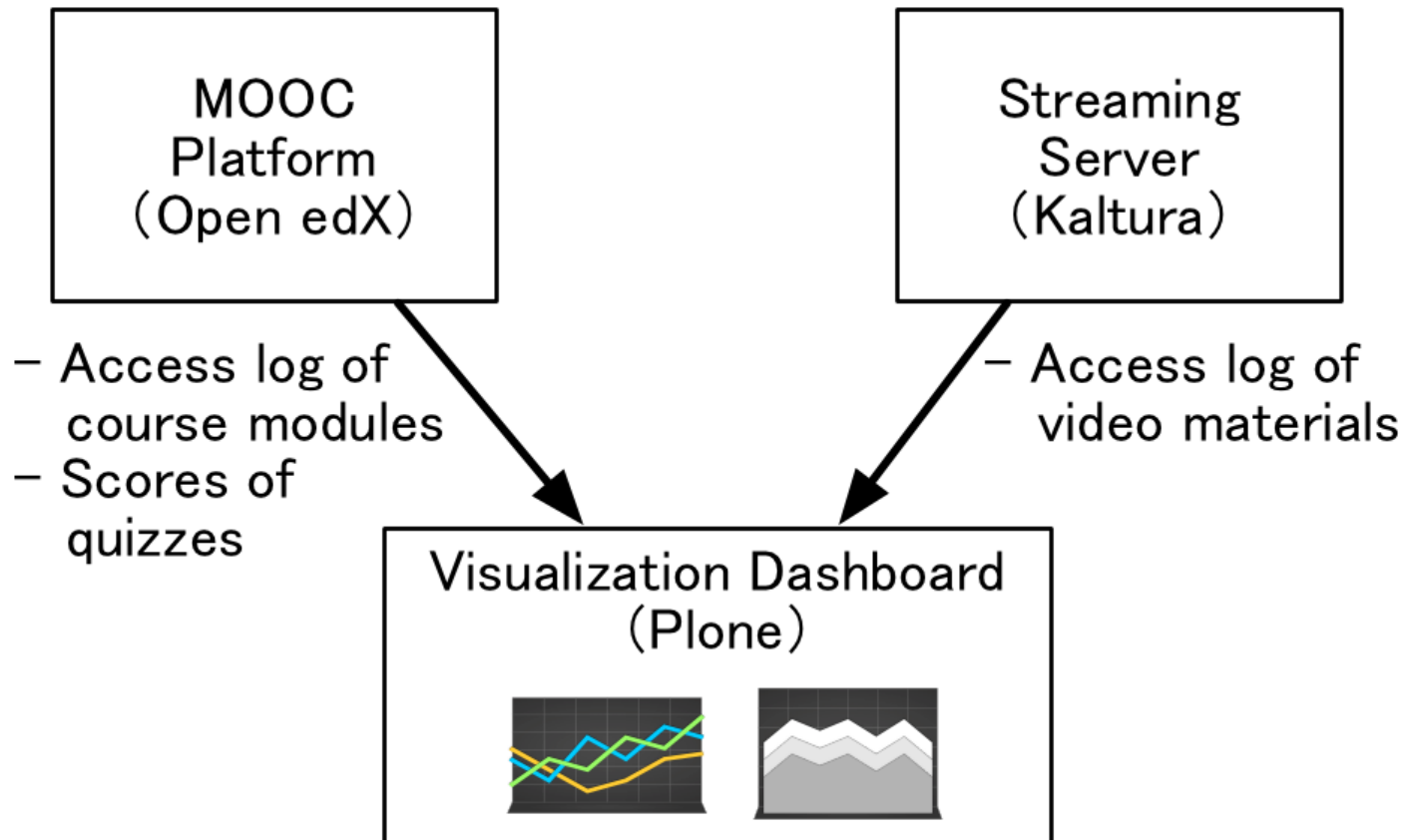
The screenshot shows the ACE homepage. At the top left is the ACE logo and navigation links: "このサイトについて", "コース一覧", "参加大学", and a "ログイン" button. The main content area features the ACE logo, the text "Academic Commons for Education", and "道内国立大学による教養教育のためのオープン教材" next to a map of Hokkaido. Below this is a row of logos for member universities: 北海道大学, 旭川医科大学, 北海道教育大学, 北見工業大学, 室蘭工業大学, 帯広畜産大学, and 小樽医科大学. A featured course card for "ACEHU001 応用倫理学入門" is displayed, with a description: "倫理と社会のつながりを理解するために応用倫理学諸領域について概観し、各領域における倫理的諸問題を紹介する。" and the date "2014年4月14日 AceHokudaiX". A "受講する" button is at the bottom of the card.



The screenshot shows the ACE course page for "AceHokudaiX: ACEHU001 応用倫理学入門". The top navigation bar includes "学習する", "お知らせ", "ディスカッション", "成績", "シラバス", and "講師". The main content area is split into two columns. The left column contains a table of contents with items like "応用倫理学とは", "イントロダクション", "応用倫理学とは", "応用倫理学の基礎概念", "まとめ", "問題", "応用倫理学の考え方", and "生命倫理 (安楽死・尊厳死)". The right column features a video player for "w01_001_c01" showing a lecturer in a suit. The video player has a "kaltura" logo and a "1-1 倫理学と応用倫理学とは" overlay. Below the video is a "スタッフ用デバッグ情報" link.

<http://ace.iic.hokudai.ac.jp/> (Sign-in required)

Learning Analytics Tool using Plone

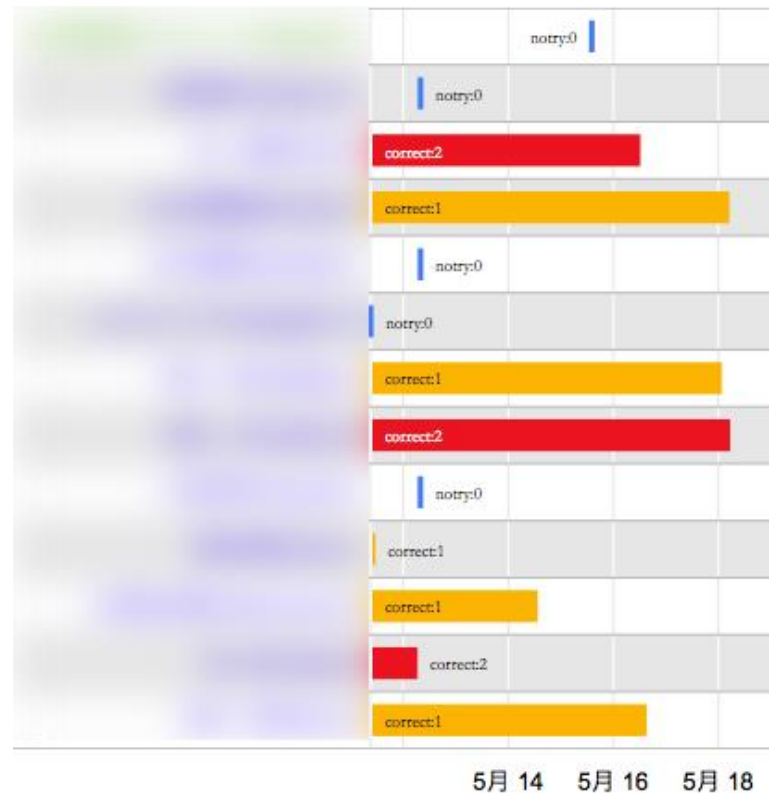
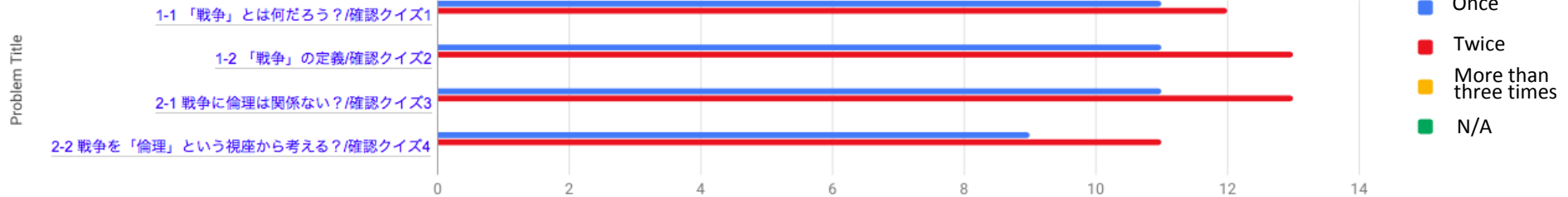


- Grasping how students study at home

Visualization Dashboard(1)

Scores of quizzes and status of login

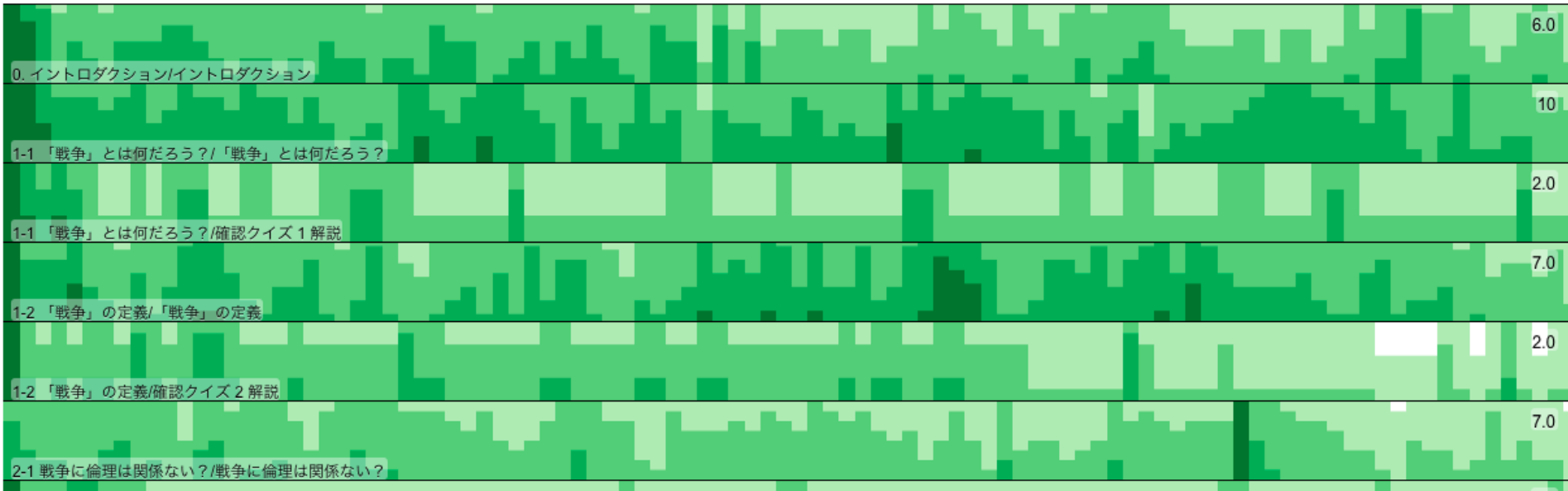
How many times do students submit their answers for quizzes?



Visualization Dashboard(2)

Grasp access to video materials

Where in videos do students frequently access?



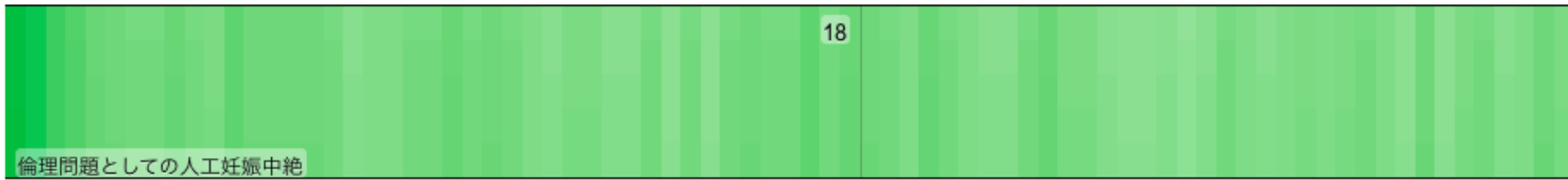
- Overall trend and individual trend
- Show the frequency of access by shade of color

Visualization Dashboard(2)

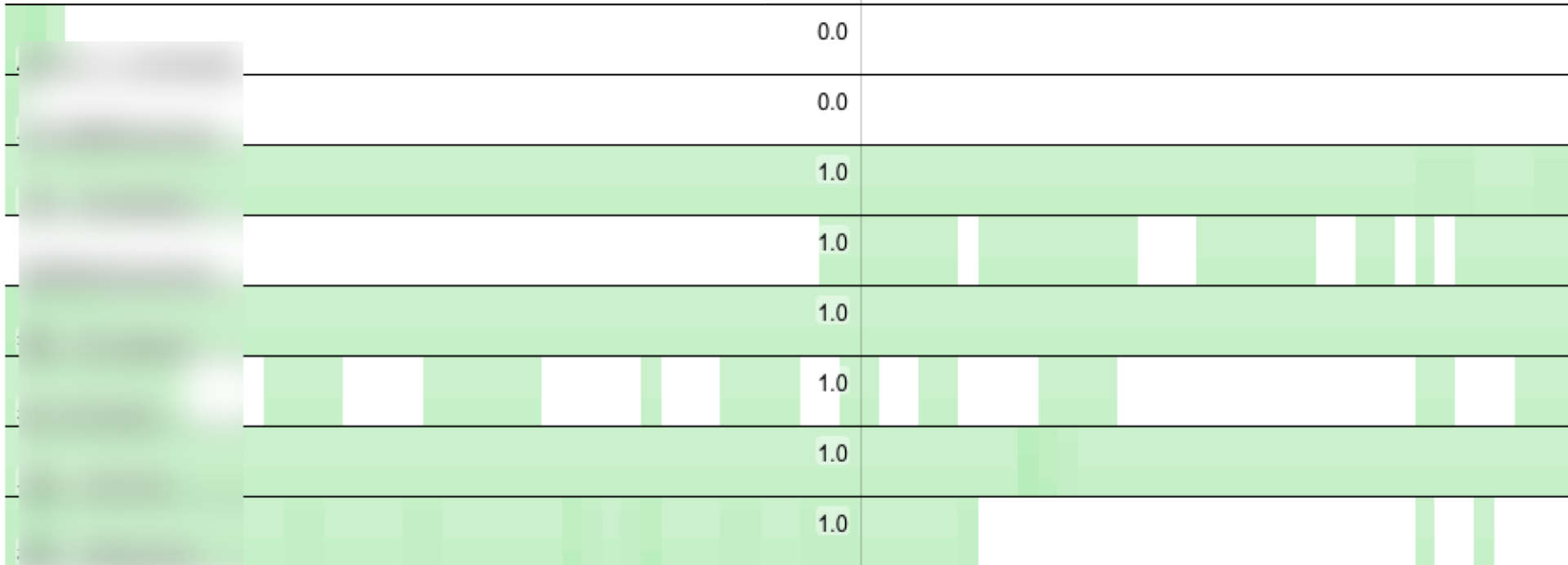
Grasp access to video materials

Video: Induced Abortion

Where in videos do students frequently access?



Where in videos does each student access?



In class...



- Activities
 - Discussions, presentations, writing papers, and developing students' OER

In class...



- Connected with another university
- Staffs as TAs

Some examples of students' OER

What is the "my number"?

1. To begin with...

「マイナンバー制度」って結局どんな制度なの？

こうっていませんか？

2015年1月実施の内閣府世論調査よ
いる」と答えた人は、わずか28.3%で
生活に関わる重要な制度であり、適切

Election campaign using the Internet

そもそもタイトルにもある「ネット選挙
るのでしょうか？

ここでは、簡潔にいうとインターネットを
す。この言葉はインターネット上で投票自
が、ここでは区別することにします。ちな
いされる方がいますが、インターネットを
ん。確かに、ネットを使って投票ができれ
く、こちらはもう少し先になりそうなので
動は2013年4月に公職選挙法が改正されたことによつて解禁となりました。改
正前は選挙の公正、候補者間の平等を確保するため、選挙運動期間中に行われる文
書図画の頒布、掲示その他の選挙運動について一定の規制をしてきました。イン
ターネット等による情報の伝達も文書図画の頒布にあたるものとして規制されてい
ました。しかし改正により、具体的にはウェブサイトおよび電子メールを利用した
方法が解禁されたのです。

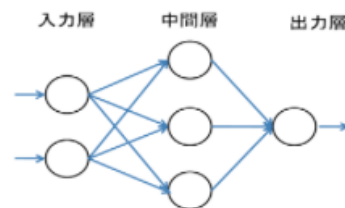
【選挙運動とは】

判例・事例によれば、選挙運動とは、「特定の選挙について、特
定の候補者の当選を目的として、投票を得る又は得させるために

Deep learning

ディープラーニングとは中間層がたくさんあるニューラルネットワークを指す。

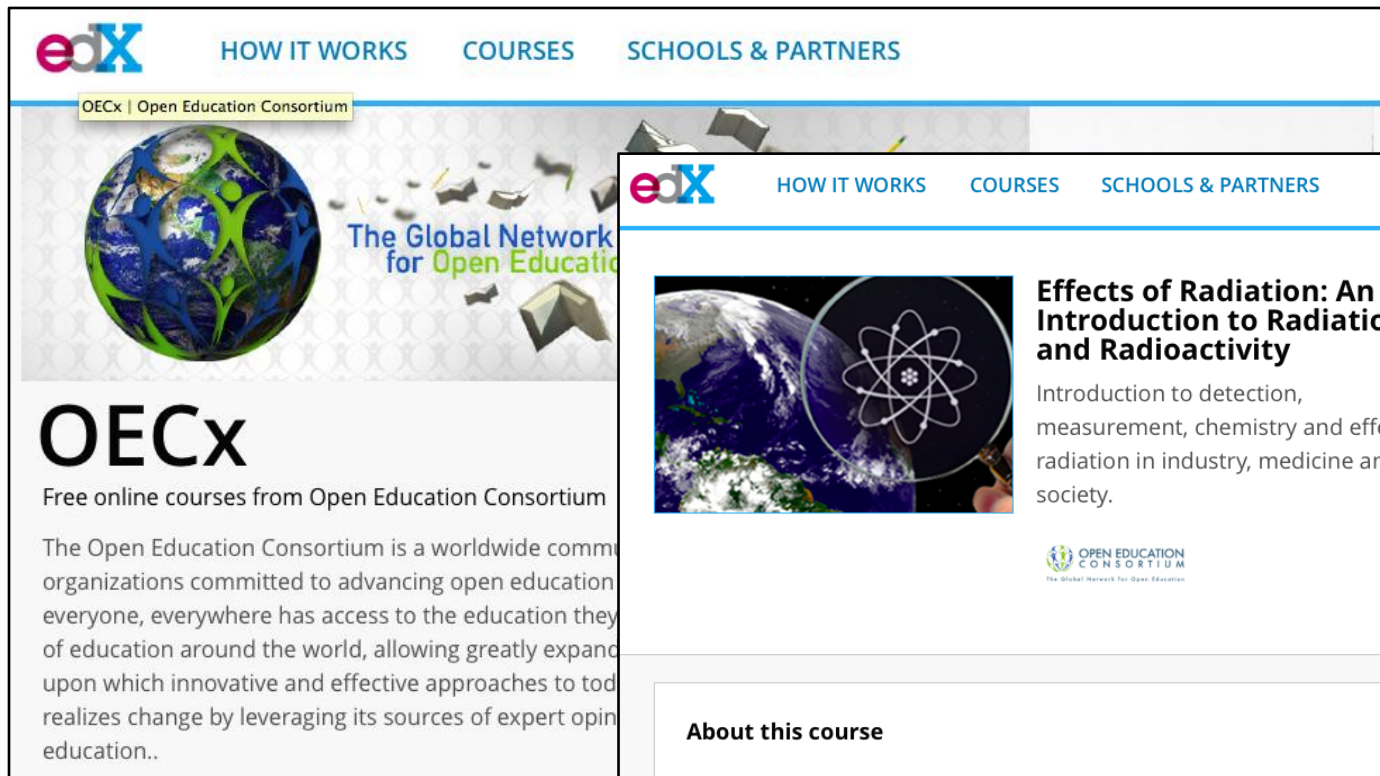
ニューラルネットワーク：人間の脳にあるニューロンを真似して作られた入力層、中間層、出力層の3層から成り立つ。



(図2)ニューラルネットワークの図

MOOC using our OER

- Jul. 14 – Aug. 24

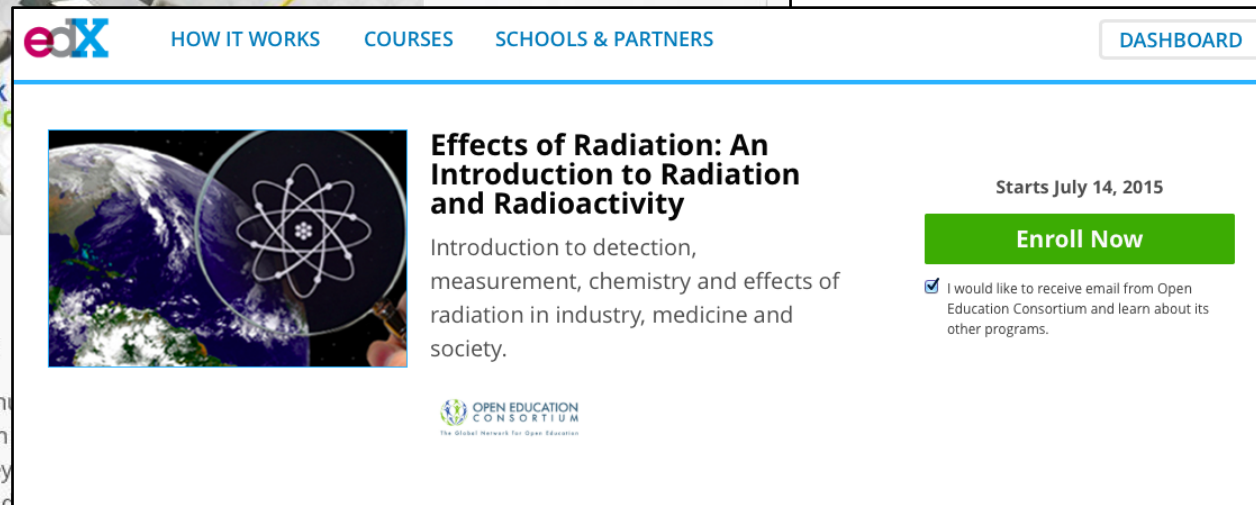


edX HOW IT WORKS COURSES SCHOOLS & PARTNERS

OECx | Open Education Consortium

OECx
Free online courses from Open Education Consortium

The Open Education Consortium is a worldwide community of organizations committed to advancing open education everywhere, everywhere has access to the education they need. The Consortium provides a global network of education around the world, allowing greatly expanded access to education and learning opportunities upon which innovative and effective approaches to today's education are realized. Change is being realized by leveraging its sources of expert opinion and education..



edX HOW IT WORKS COURSES SCHOOLS & PARTNERS [DASHBOARD](#)

Effects of Radiation: An Introduction to Radiation and Radioactivity

Introduction to detection, measurement, chemistry and effects of radiation in industry, medicine and society.

Starts July 14, 2015

[Enroll Now](#)

I would like to receive email from Open Education Consortium and learn about its other programs.

OPEN EDUCATION CONSORTIUM
The Global Network for Open Education













About this course

There are many practical applications of radiation and radioactivity in various fields, including medical, scientific, and industrial activities. In some parts of Japan, people continue to experience environmental radioactivity caused by the nuclear accident at the Fukushima Daiichi Nuclear Power Plant on a daily basis. Understanding the basic science of

[See more](#)

⚙️ Level:	Introductory
🕒 Length:	4 weeks
🕒 Effort:	2-4 hours/week
🎓 Subject:	Science
🏛️ Institution:	OECx
🗣️ Languages:	English

MOOC using our OER

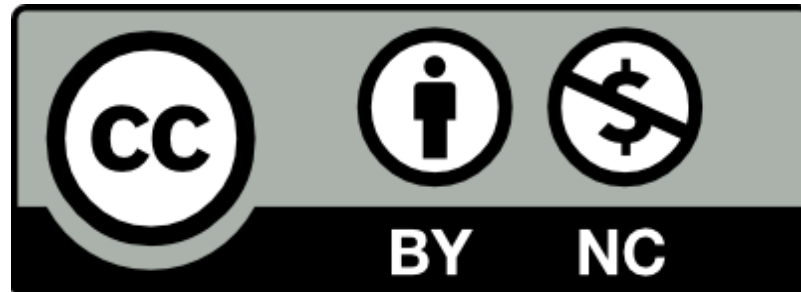
 <p>VERIFIED </p> <p>OECx TESS101x</p> <p>Enhancing Teacher Education Through OER</p> <p>Starting Soon Starts: November 23, 2015</p>	 <p>VERIFIED </p> <p>OECx PH242x</p> <p>The Biology of Water and Health- Sustainable Interventions</p> <p>Current Starts: September 29, 2015</p>	 <p>VERIFIED </p> <p>OECx RADIO101x</p> <p>Effects of Radiation: An Introduction to Radiation and Radioactivity</p> <p>Archived Starts: July 14, 2015</p>
 <p>VERIFIED </p> <p>OECx B1156x</p> <p>Responsabilidad Social Corporativa y su impacto sobre la Gestión de la Tecnología de la</p> <p>Archived Starts: July 7, 2015</p>	 <p>VERIFIED </p> <p>OECx PH241x</p> <p>The Biology of Water and Health – Fundamentals</p> <p>Archived Starts: July 7, 2015</p>	 <p>VERIFIED </p> <p>OECx BP111x</p> <p>Business and its Environment: An Overview of Business and the Role of Finance in Business</p> <p>Archived Starts: May 18, 2015</p>

RADIO101x: Effects of Radiation

- Title** : Effects of Radiation: An Introduction to Radiation and Radioactivity
- Length** : July 14, 2015 – August 24, 2015
- Assignments** : Weekly quizzes (50%), Mid-term exam (40%), Final exam (10%)
- Prerequisites** : None (High-school physics/chemistry is preferred)
- Instructors** : Eight instructors from engineering/veterinary medicine department



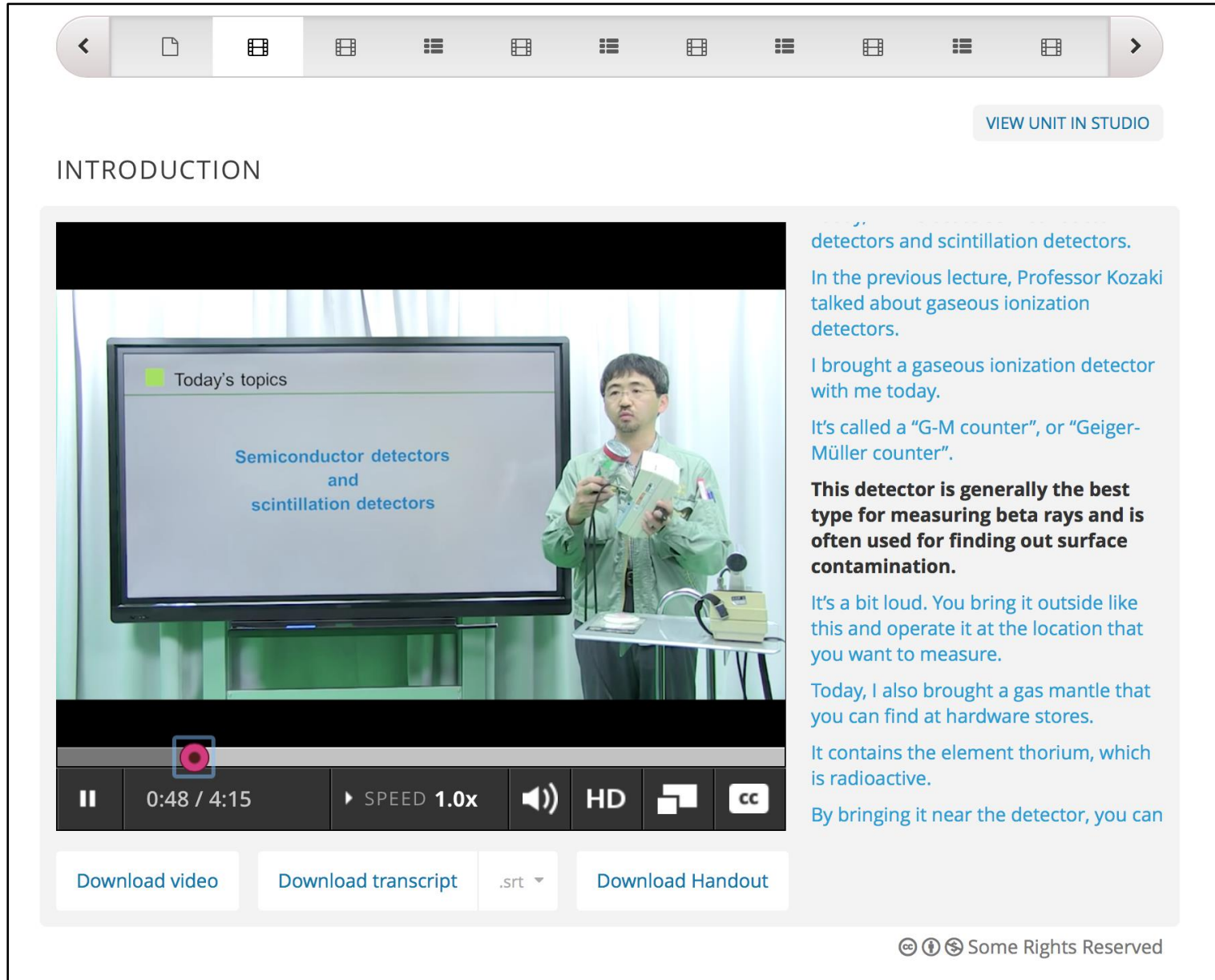
Making the MOOC “open”



Creative Commons Attribution-NonCommercial license
(CC BY-NC)

“This means that the course allows learners not only to openly register and freely learn online, but also to reuse, revise, and remix almost all of the materials used in the course as long as you use them for non-commercial purposes.”.

Making the MOOC “open”



The screenshot shows a video player interface. At the top, there is a navigation bar with icons for back, home, search, and other functions. Below the navigation bar, there is a button labeled "VIEW UNIT IN STUDIO". The main content area is titled "INTRODUCTION" and features a video player. The video player shows a man in a green jacket standing next to a large screen. The screen displays the text "Today's topics" and "Semiconductor detectors and scintillation detectors". The video player controls at the bottom show a play button, a progress bar at 0:48 / 4:15, a speed control set to 1.0x, a volume icon, an HD icon, a full screen icon, and a CC icon. Below the video player, there are buttons for "Download video", "Download transcript", ".srt", and "Download Handout". To the right of the video player, there is a text overlay with the following content:

detectors and scintillation detectors.

In the previous lecture, Professor Kozaki talked about gaseous ionization detectors.

I brought a gaseous ionization detector with me today.

It's called a "G-M counter", or "Geiger-Müller counter".

This detector is generally the best type for measuring beta rays and is often used for finding out surface contamination.

It's a bit loud. You bring it outside like this and operate it at the location that you want to measure.

Today, I also brought a gas mantle that you can find at hardware stores.

It contains the element thorium, which is radioactive.

By bringing it near the detector, you can

© ⓘ Ⓞ Some Rights Reserved

The completion rate

Number of registrants : 4342

Those who completed : 380

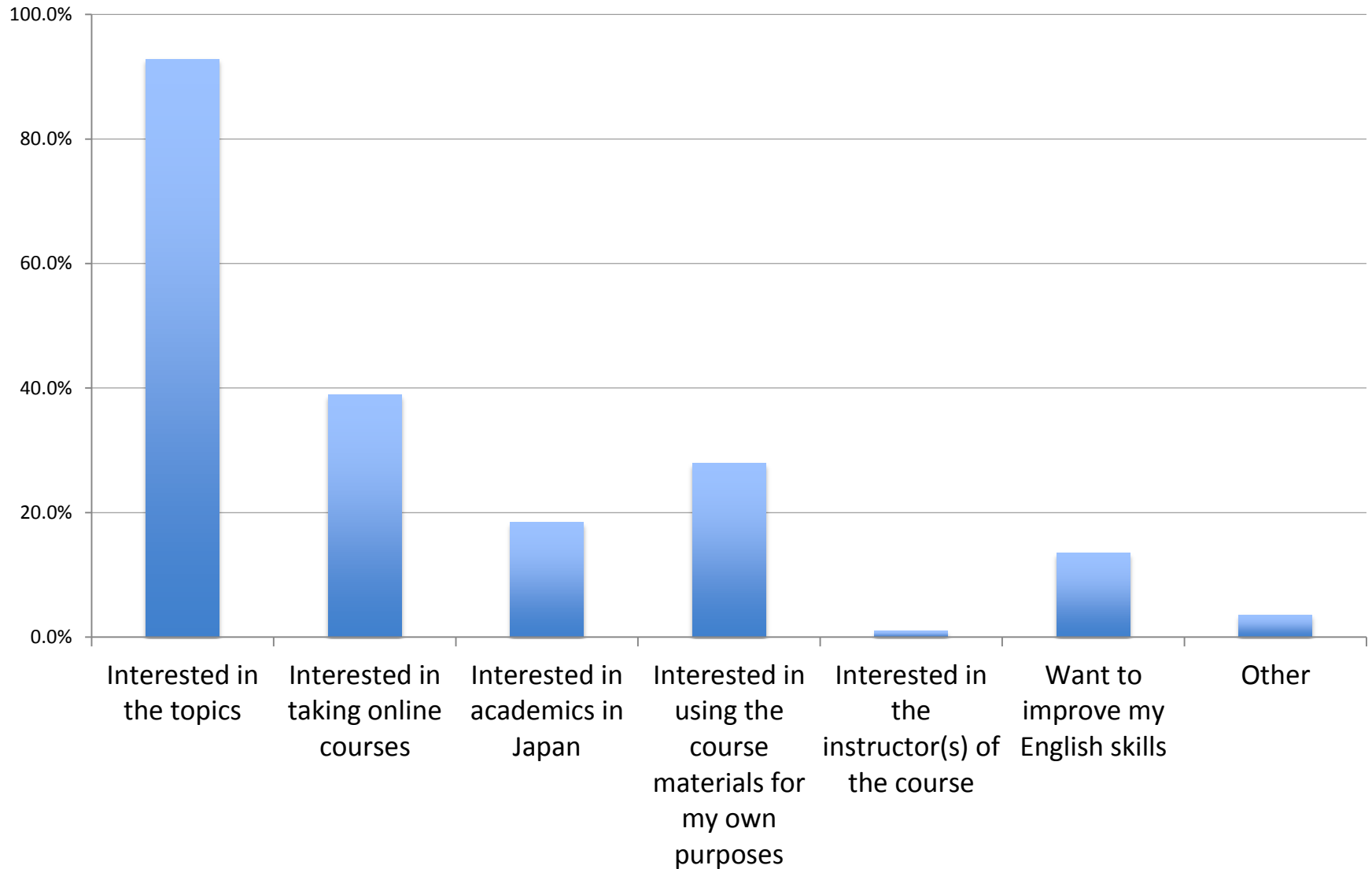
Those who visited : 1385

※As of Sep. 14, 2015

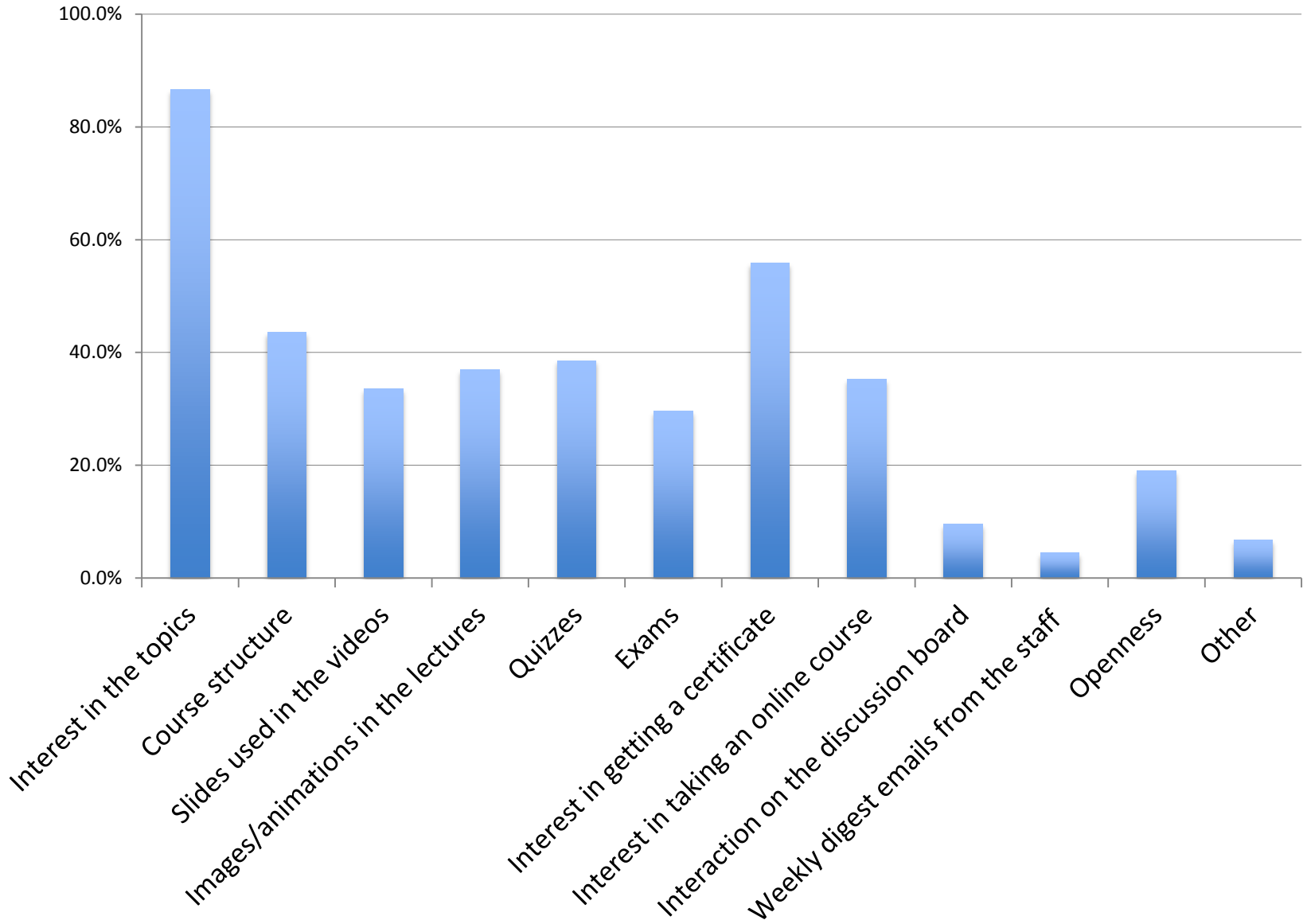
$(\text{Completed}) / (\text{Total registrants}) = 8.7\%$

$(\text{Completed}) / (\text{Visited}) = 27.4\%$

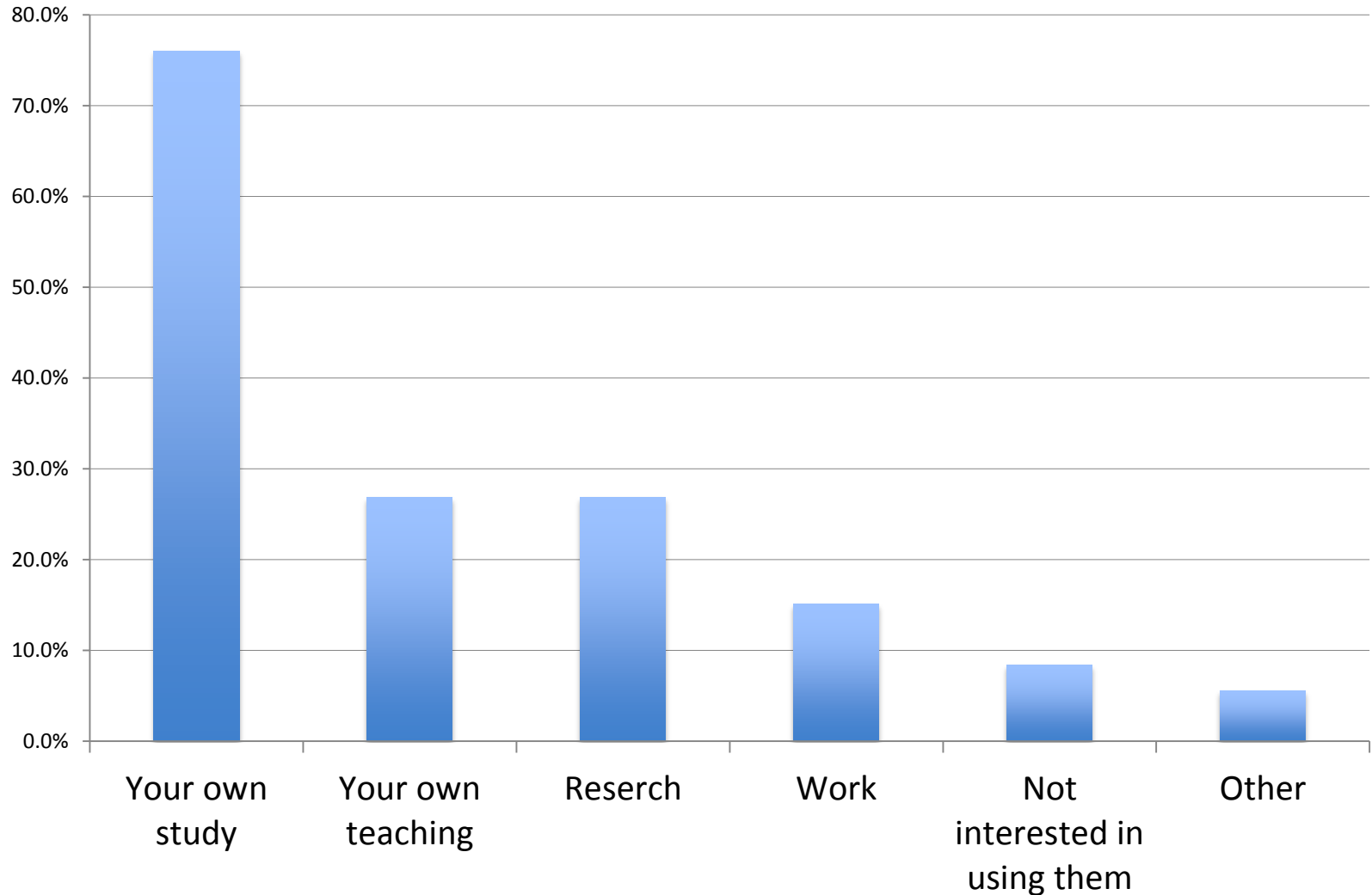
Motives for taking the course



What made them reach to the end?



How would they use the course materials?



Prospective Outcomes

- Realize diversity of liberal arts education
 - Improve effectiveness of distance learning among universities
 - Dissemination of open educational resources
- Increase learning opportunities by MOOC
 - Promotion and internationalization
 - Open MOOC on global consortium (edX)
- Practice to apply SPOC and MOOC among campuses
 - Improve student outcomes with distance learning