

Using "Shin-Godzilla" as Material for OER-based Course Development

Kazuya Kobayashi, Hiroaki Tanaka, Katsusuke Shigeta, Keiko Suzuki, Richard Stone Hokkaido University, Center for Open Education
Tamotsu Kozaki, Naoko Watanabe Hokkaido University, Graduate School Faculty of Engineering



Summary

By using OER repeatedly both on and off campus and looking at the feedback from each usage, we attempted to create a cycle in which we continue to improve our resources with each use. Additionally, the unexpected theme of teaching students how to think like an engineer appeared while using these resources, and provided an overall improvement to the course curriculum. Our next goal is to work on a MOOC for Japanese audiences.

"Shin-Godzilla" is a monster created by radiation

2011

2013

2015

2016-

Fukushima Daiichi nuclear disaster

In Japan, interest in radiation and radioactivity has started to rise after the disaster that occurred at the Fukushima Daiichi Nuclear Power Plant. In response to this, the Hokkaido University Faculty of Engineering aimed to help provide basic knowledge concerning radiation and radioactivity to the public. The goal was to provide an education to all learners - ranging from laypersons to specialists - that can cover a broad range of topics - from basic theories to their application.



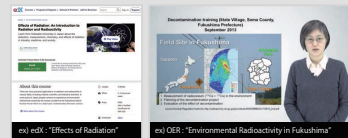
Developing OER for OpenCourseWare

In 2013, the Hokkaido University Faculty of Engineering began development of OER on this topic. We, the Hokkaido University Center for Open Education, joined this project in 2014 and has since provided full support for the creation of educational videos. We have helped with the filming, editing, educational material design, and broadcasting of these resources. OER developed were uploaded to Hokkaido University's OpenCourseWare website (managed by us). Afterward, a request came from the Open Education Consortium to us to create a MOOC about nuclear power.



Developing OER for MOOC

We then got to work on "opening" our content. In other words, we used these OER in order to create a MOOC and broadcast these materials to a wider audience. We collected feedback from the MOOC's participants and used this data to try and improve the content. In order to do this, used Instructional Design Theory in order to segment, structuralize, and clarify the course's goal. We also obtained a Creative Commons license for copyright. The OER were translated into English and uploaded onto edX. We then used the data gathered from this experience in order to start improving the materials. Courses were given by researchers in various fields.



On-Campus Use in "Flipped Classrooms"

The improved OER were then used once again on campus as preparatory material for a flipped classroom style course. This course became part of the regular curriculum. It was conducted as an omnibus course by 5-8 professors (depending on the year) with different areas of specialty. Furthermore, this course was offered as a remote-class in several of Hokkaido's national universities. Additionally, the Center for Open Education created a new platform (LMS) in order to broadcast the preparatory videos for this course. This new platform was equipped with various tools for learning-analysis and a viewing log. These tools were helpful for improving these materials. This course was offered annually from 2016 to 2018. Between 23 and 28 students participated each year.



In 2016, Developing New Classes through Practice

Because both humanities and science students were taking this course, it was necessary to assume that some participants would not have a basic grasp of Physics. Moreover, it was necessary to think about how to simultaneously provide an education on this topic while increasing interest in the course from students.



Hence, we suggested that professors use the easily accessible OER they had already made as preparatory materials for the course. We also suggested that they use the movie "Shin Godzilla" as the course's theme, due to the fact that this movie depicted how modern Japanese society responded to a monster created by radiation. By expanding the scope of the course content from how nuclear energy exists in the real world to how it has been treated in works of fiction, instructors were able to help students not used to Physics understand without trivializing the difficulty of the calculations needed to understand nuclear power. Instructors based their lectures on the OER they created themselves, and then created assignments based on the theme of Godzilla.

Learning Geiger counters :

Students learn how to use a Geiger counter by identifying Geiger counters in film and determining if they are being used correctly.



Learning Quantum beam :

A lecture in which the instructor analyzes the beams that Godzilla fires.



Express what students have learned

Students also gave a final presentation for this class. The goal was to use their knowledge of radiation and radiology to give a presentation aimed at high school students.

Some examples of student presentations include:

- How to design a shelter that could withstand Godzilla's radiation
- A proposal for an effective evacuation plan for escaping from Godzilla
- An investigation of Godzilla's body-structure (using information from the movie as a base)

Course assignments based on the theme of "Godzilla"

While using the movie as material for course assignments did require extra effort from the instructors, the added variation resulted in appealing lectures for students. Both course content and assignments improved every year upon receiving feedback from students. This point is reflected in the positive evaluations and comments given in course surveys.

Learning Radioactive waste :

Students were asked to treat the now-defeated Godzilla as a massive example of radioactive waste. Students thought from an engineer's standpoint to assess 1) how to safely dissect Godzilla and 2) appropriately store this example of nuclear waste underground.



Learning Chart of the Nuclides :

A group assignment based on Godzilla emitting a new radioactive element. Students used information from the film and the chart of the nuclides to discuss what pre-existing isotopes most resembled this "new element".



Final Presentation



Students were unable to accurately grasp the intent behind this assignment in the first year. While there were some rather farfetched presentations at first, the quality of student presentations continued to improve.



OER-based Course Development

Course Launched

Learning & practices

Final Presentation

Our Goal

授業実践を踏まえて、日本語版のMOOC 開講など

Improving the Curriculum

As a related point to the rather farfetched presentations at the course's inception, it became clear over time that using a fictional object in class required us to utilize current scientific knowledge to make several hypotheses about the nature of that object in order to make the necessary calculations. This point served as a chance to let students learn what it means to "think like an engineer". This gave the course a new theme. Instructors thus adjusted their lecture content and assignments to reflect this. During their lectures, instructors showed students how to think like an engineer - i.e., how to make a hypothesis and calculate data.

In turn, students learned how they could go about this process in their final presentation. This process was integrated into lectures naturally and helped tear down walls between students in the humanities and sciences, thus creating a more appealing class. This point is worthy of further research. This course was conducted for 3 years. Using our analysis, we sought to improve the content of the OER, the order in which these resources were shown to students, and the connection between these resources and actual lectures. Every year, the course content improved, as demonstrated by the end of the semester surveys.

OER Use and Improvement

In this final presentation, both teachers and fellow students assessed whether the presentation had correctly understood the relevant information concerning radioactivity and radiation. During this mutual-evaluation of one another's presentations, students were required to revisit the OER prepared in the course to check and, as a result, review the content presented in these resources. The Center for Open Education utilized both these evaluations and data from video viewing logs in order to determine student. This is also one more point we wish to continue improving.