Improving flipped classrooms for better PBL implementation in everyday study

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1. What this project is about?

Flipped classrooms is a modern teaching form where explanation of theory is delivered outside a classroom, most often online, through video-lectures. The video lectures are usually supplemented with quizzes for self-control. Flipped classes strategy fits the PBL approach perfectly well as it gives more time for interaction with students when they work on real problems via seminars, workshops, mini-projects etc. It also makes cross-campus teaching more efficient.

In this project we tried to improve this concept by using experience from another modern educational trend — **Massive Online Open Courses** (MOOC) which are getting more and more popular during the last several years. MOOCs initially developed for on-line education and are based on dedicated IT-platforms for effective delivering of educational activities.

So, the goal of this project was to use experience and IT-solutions from MOOC to **make flipped classrooms teaching more efficient and attractive to students**.
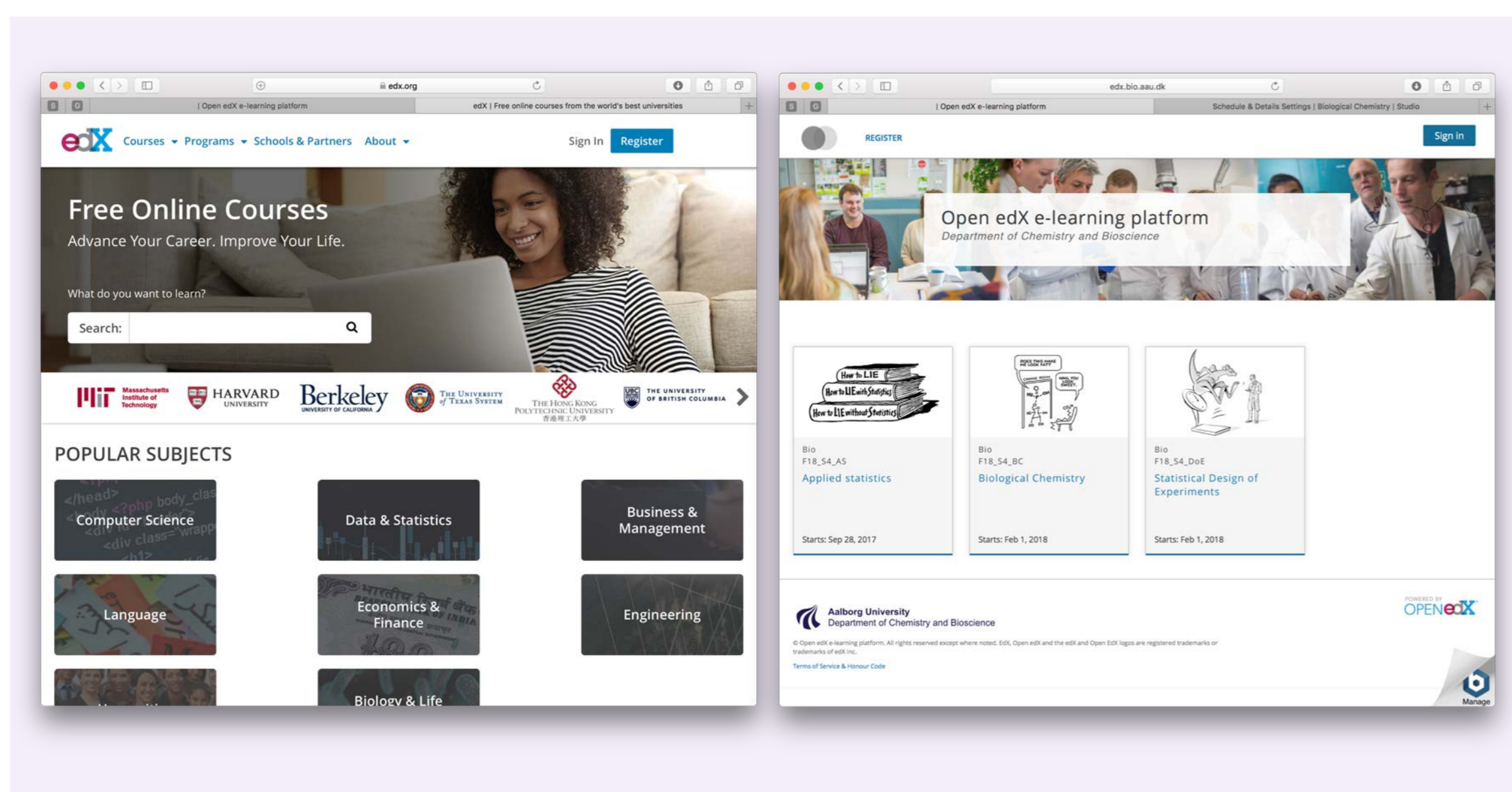

Fig. 1. The edX platform and its small "brother" Open edX at Bio

Fig. 2. Course structure in Open edX

2. What is done?

The first step was a study of all approaches and IT-platforms used in MOOC world. It resulted in selection of **Open edX** — open source solution from the second biggest MOOC provider, edX, developed by MIT, Harvard and several others (Fig 1).

The second step was installation of the platform at AAU and adjusting its functionality for our needs. As a result in spring 2017 a first Open edX based course — *Applied Statistics* (95 students in total) has been launched.

The third step was to improve both the platform functionality as well as the procedure and some peculiarities for creating Open edX courses based on feedback from students and teacher's experience. The *Applied Statistics* course has been updated and currently being running again for 105 students. Another course — *Statistical Design of Experiments* (30 students) was launched this spring.

3. What are the key features?

One of the most important features is representation of traditional lecture as a learning sequence. **Learning sequence** is a set of short (5-15 minutes) video fragments, quizzes, interactive applications and illustrated web-pages with course materials. All items are organized using an intuitive user interface which makes access to any learning sequence as well as any part of it very easy (Fig 2). *Information is easier to digest when it is split into small portions.*

Teacher can control a performance of all students almost in real time and see how active students are, which parts of the course are more difficult etc. Everything is done via **interactive gradebook** which functionality has been improved as a part of this project activities (Fig 3).

Creating a course is done using interactive interface and does not need any special skills from teacher (but knowledge of basic HTML will extend possibilities). Quizzes are made using very simple text markup (Fig 4).
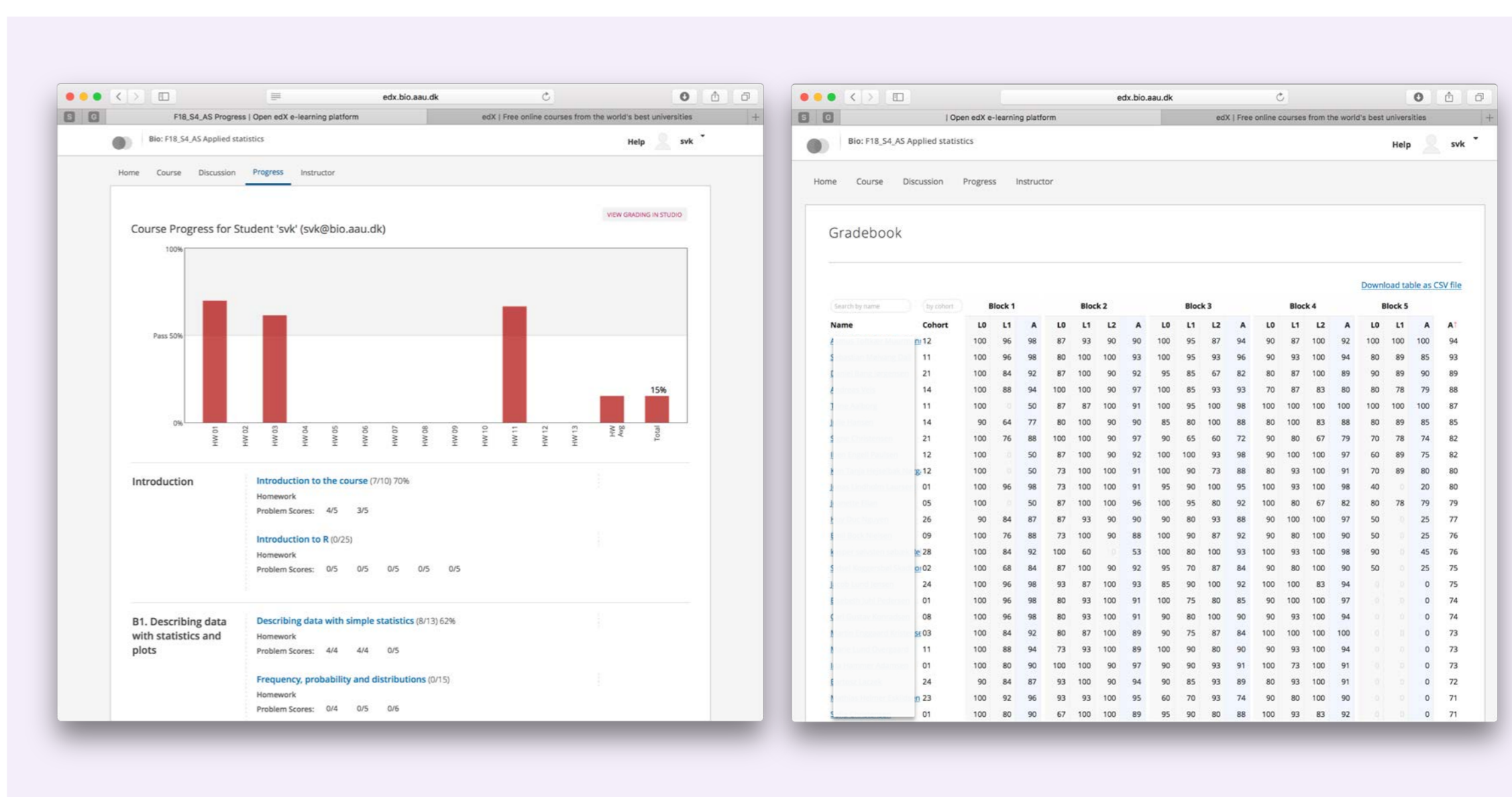

Fig. 3. Gradebook for a student (left) and teacher (right). Student names are hidden
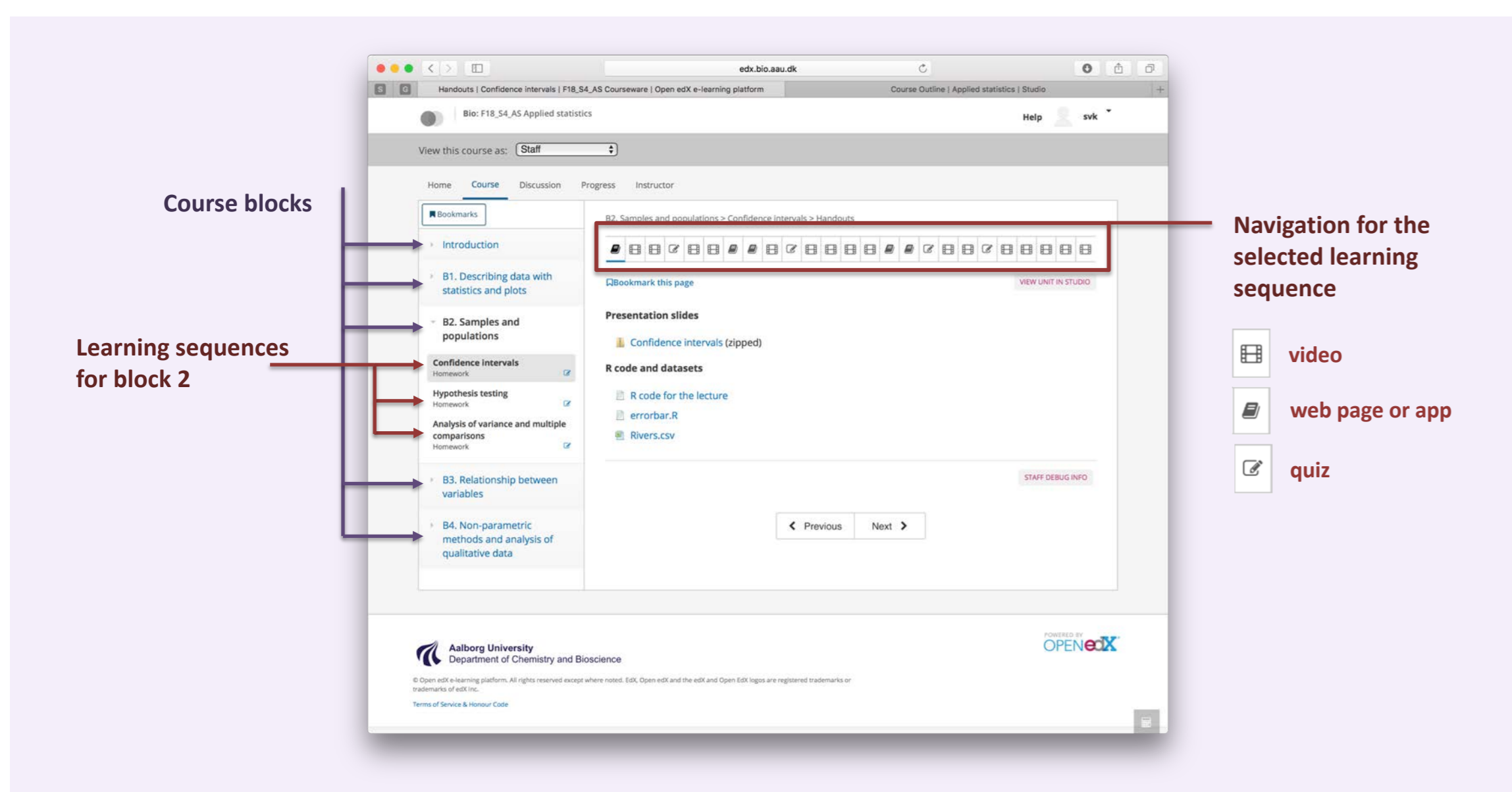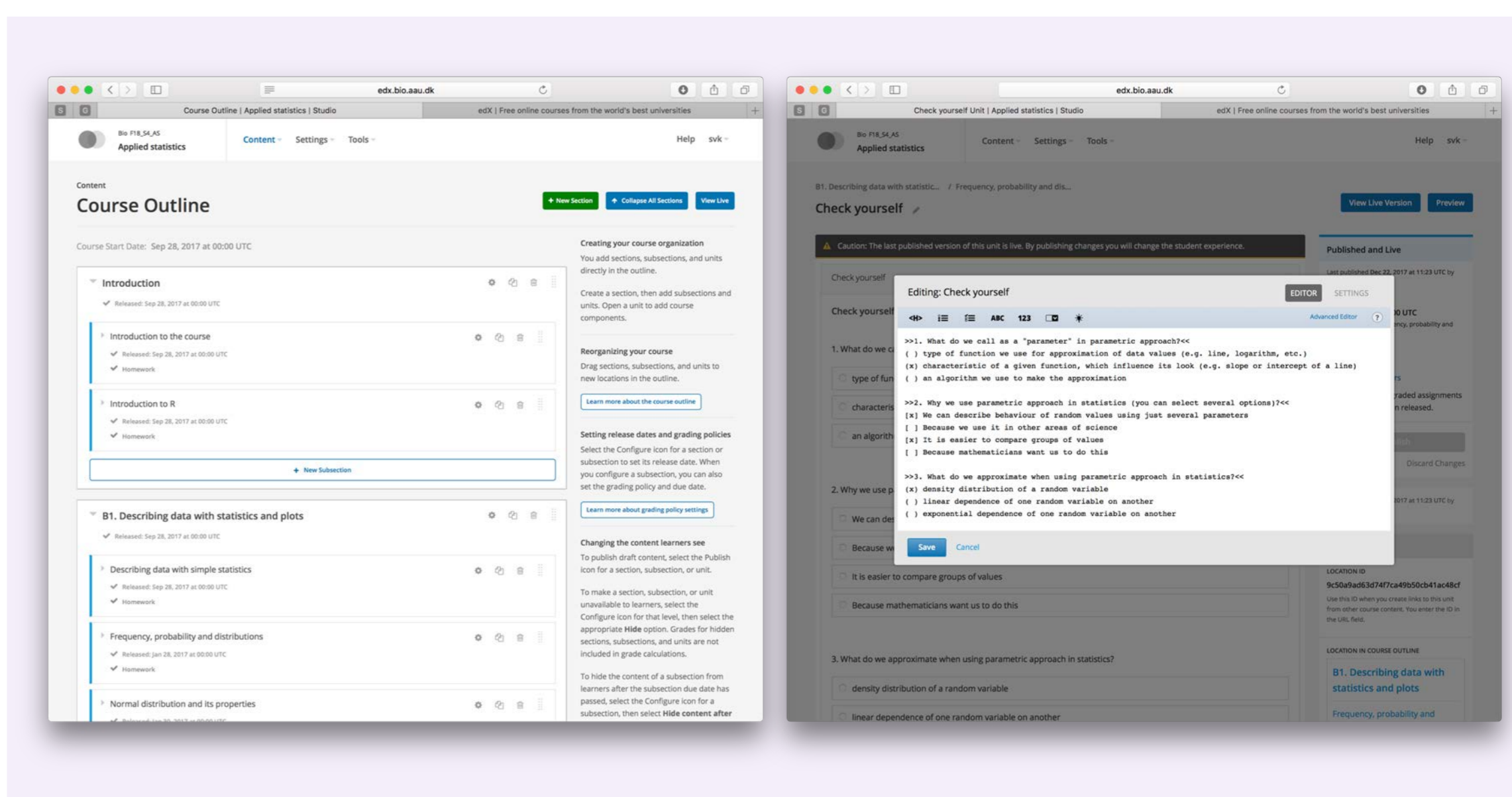

Fig. 4. Course creator interface

4. How well does this work?

Most of the students are very satisfied with the new form of teaching and the Open edX platform. Many found the learning sequences very efficient as there is no need to arrange several hours for learning and easy to re-watch most difficult parts.

From teacher's side — very efficient for teaching courses with large number of students (100 or more) and for cross-campus teaching. Quizzes made for small parts instead of a whole lecture give a possibility to see what is going on with course activities and understanding almost in real time.

At the same time, creating a course for Open edX takes almost the same time as conventional flipped classes with long videos and large quizzes.