"An introduction to development economics, from the urgent issues of global poverty and economics models that might explain them, to the policy implications of those models." – edx.org

Introduction. 14.73x is a course for those who are interested in the challenge posed by massive and persistent world poverty, and are hopeful that economists might have something useful to say about this challenge. The questions addressed include: Is extreme poverty a thing of the past? What is economic life like when living under a dollar per day? Are the poor always hungry? How do we make schools work for poor citizens? How do we deal with the disease burden? Is microfinance invaluable or overrated? Without property rights, is life destined to be "nasty, brutish and short"? Should we leave economic development to the market? Does foreign aid help or hinder? And many others. At the end of this course, interested in poverty today, and hopefully a few answers as well.

14.73x was offered as an MITx on edX course in the Spring of 2013. It was taught by Professors Esther Duflo and Abhijit Vinayak Banerjee.

Many participants in MITx on edX courses come with different intentions and levels of interest and many resemble shoppers and auditors in their course activity. This report identifies four subpopulations of participants (numbers below): those who registered, viewed some course content, explored the course, and were certified¹.

<table>
<thead>
<tr>
<th>Important Dates</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 19, 2012</td>
<td>Registered 39,759</td>
</tr>
<tr>
<td>February 12, 2013</td>
<td>Viewed 24,915</td>
</tr>
<tr>
<td>May 21, 2013</td>
<td>Explored 6,147</td>
</tr>
<tr>
<td>September 8, 2013</td>
<td>Certified 4,597</td>
</tr>
</tbody>
</table>

¹ See page 4 for definitions

Course structure refers to the type, frequency, and order of resources in a given course. Within an MITx on edX course\(^2\), course structure is composed of a few base resource types (problems, videos, html pages), each categorized under a specific course component. Figure 1 visualizes the 542 resources of 14.73x in terms of their course component categories, where each line indicates a separate resource, and the length approximates the weight of the component toward final course grade (lecture sequences do not count). Text labels indicate selected chapters, which are the highest level on the “courseware” menu that houses the course content.

For 14.73x, Lecture Sequences formed the base learning material released in each chapter. Each sequence consisted of modularized videos (orange) taken from Professor Duflo’s on-campus lectures at MIT in 2011, with finger exercises (black) interspersed between all videos. Higher-level assessment was administered through Homework (Silver) consisting of numerical and formula response. Supplemental learning components (not pictured in Fig. 1) included a threaded discussion forum for students and staff, live skype-chat office hours, and community voted questions answered directly by the instructors (see page 7). An eText (*Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty* [Banerjee and Duflo, 2012]) was provided alongside articles and select chapters from other texts.

The release of chapters in 14.73x occurred over roughly 13 calendar weeks. Final course grades were determined by

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\(^2\) Often colloquially referred to as a Massive Open Online Course (MOOC)
performance in the lecture sequences (25%) and nine homework sets (75%). Certification was granted to students whose final grades were 50% or greater.

To date, MITx courses on edX have had similar schedules of regularly released resources and periodic due dates. Like 14.73x, courses have used quantitative assessment supported by lecture sequences and textual material, as well as a few special learning components (see end of this report). In the figures that follow, we compare 14.73x data with those from other MITx courses on edX, from the Fall 2012 to Summer 2013.

**Demographics.** For 14.73x, we have records of 39,759 students who registered for the course by the cutoff date of this report, September 8, 2013. According to self-reported demographics, registrants were 53.6% men, and as a group, highly educated: 40.8% have earned bachelor’s degrees, 36.0% have masters or professional degrees, and 4.9% of registrants had earned a doctorate (for certified students, percentages are 39.5%, 42.5%, and 4.7%, respectively). Distributions of level of education and gender are plotted below in Figure 2, along with the average distributions for all MITx courses\(^3\). Note, roughly 6% of 14.73x registrants did not self-report one or more of the demographic categories.

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As with other MITx courses on edX, 14.73x students came from all over the world. Based on geolocation of student IP addresses, 28.5% of registrants came from the United States, but many students also came from over 150 other countries around the world. Consistent with other MITx courses on edX, the median age of registrants and certified students were higher than those of typical MIT undergraduates; namely, 29 and 30 years, respectively. Distributions of geolocated country and age are plotted in Fig. 2 for 14.73x, alongside the average distributions for and all MITx courses.

Figure 3: Participants separated into four mutually exclusive and exhaustive categories (not to scale).

**Participants in 14.73x.** Who are the students taking this course, and how much did they participate? The degree and kind of participation in the course varied considerably among those who signed up for 14.73x. Furthermore, like many MOOCs, this course remained open to new registrants, so that enrollment continued to rise through the semester. This asynchronicity is a key feature of open online courses. One feature of low barriers to registration, for example, is a large number of students who registered but never actually viewed any course material.

To illustrate the considerable variability in participants by their actions, we identify four subpopulations of interest within this course: those who (1) only registered, and never accessed the courseware, (2) only viewed, i.e. non-certified registrants who accessed at least one chapter but less than half of chapters, (3) only explored, i.e. non-certified registrants who accessed half or more of the chapters, and those who were (4) certified, by earning a final grade at or higher than the cutoff.

Certificate earners are the most conventional subpopulation, defined by crossing a certain threshold of achievement on quantitative assessments (well defined for 14.73x). The “only explored” subpopulation seeks to represent students having interacted with a considerable amount of course material, while the “only viewed” subpopulation highlights participants having only sampled the course. Both the “only explored” and “only viewed” subpopulations contain participants with highly varying levels of activity (as highlighted in the following two sections on persistence and activity). The fourth sub-population of "only registered" contains users that registered, but never accessed the courseware. This is a substantial number in 14.73x and many of the MITx courses on edX.

For 14.73x, the numbers of students who only registered, only viewed, only explored, or were certified, are shown in Fig. 3. The categories are defined as disjoint sets by using the “only” terminology, but the figure highlights the nested nature of registration, viewing, exploring, and certification. Students who were certified
certainly viewed the course, but not all viewers were certified. Similarly, “explored” and “certified” are both subsets of viewed.

Activity in 14.73x. The activity of students in MITx courses on edX is logged; activity level can provide perspective into which courseware components are of interest to students, and which specific activities students are undertaking in a course, e.g. to earn certification.

How diverse is the activity of students in the course? Consider the grade earned by students, which is determined in 14.73x by quantitative assessment with regular due dates and periodic exams. A scatter plot (Fig. 4) depicting earned grade versus the number of chapters visited, for each registered student, illustrates the distinctions between the sub-populations of students who only viewed, only explored, or became certified in the course. This plot also illuminates some possible registrant types: “completionists” (perfect grade, viewed all chapters), “optimizers” (occasional registrants that view minimal chapters but earn a certificate), and “listeners” (viewed all chapters, zero grade – submitted no work for credit).
For 14.73x, edX recorded 32,836,628 events in its tracking logs, relating to students interacting with the course contents, through the cutoff date of this report. These events included interactions indicating when students played videos, attempted problems, browsed through text pages, read or posted entries in the forum, and other activities. Fig. 5 gives a glimpse into these data, presenting a histogram of the total number of events (“clicks”) recorded for all registrants with at least one event, and highlighting the population of students who earned a certificate in comparison with all other students. The figure also presents a histogram of the number of active days, where “active days” represents any day where a course interaction was logged. The distribution of active days for certificate earners is broad, further reflecting the variety of approaches by which a participant can earn a certificate.

![Figure 6](image)

**Figure 6:** Daily number of unique participants accessing courseware or course-site (pre-launch) via our described participant categories. Vertical dashed lines indicate the start and end of the course. Due to data loss, some information about user activity between January 21 and Feb 13 is missing and not included in the plot.

**Persistence in 14.73x.** How does the activity of students change as the course progresses, particularly with students who persist to earn certification? Figure 6 highlights courseware and course-site (pre-launch) interactions for three of the disjoint participant types: only viewed, only explored, and certified. In 14.73x, there is a noticeable periodicity in each curve that is highly correlated with content release and due dates. Certified students show a relatively stable weekly periodicity, while the periodicity of the viewed and explored curves disappears after about one-third and two-thirds of the course, respectively. It is important to note that these curves do not account for registration date or for large times between user interactions. However, they do provide insight into the collective

![Figure 7](image)

**Figure 7:** Certification fraction versus registration week relative to course launch. Bubble size represents the number of unique users registering each week.
behavior of our defined populations. It is particularly interesting to formulate hypotheses about behavior early in the course, e.g., attempting to target struggling students that may benefit from intervention.

Do students who register early have a higher likelihood of earning a certificate than students who register late? Figure 7 depicts the certification fraction versus relative week of registration (bubbles indicate total enrollment each week). Across MITx courses, certification rates do not depend greatly on registration dates prior to launch, although some courses have higher registration rates very early as well as just prior to launch. In 14.73x an initially flat pre-launch plateau is seen, where roughly 12% of the users registering prior to launch earn a certificate regardless of enrollment week; this is followed by an increase to 20% by course launch. After launch, the rate drops dramatically. Because of the highly structured due dates in 14.73x, it is reasonable to attribute most of this decay to no longer being able to pass the course, once due dates have passed.

Special Features

Each MITx on edX course includes atypical features unique to the course. The descriptions of unique features below are taken directly from the 14.73x course team report of May 22, 2013 by Noam Angrist.

• **Live Skype chat Office Hours.** Every week the course team posted a thread on Monday requesting questions for Office Hours for that week’s topic. Mid-week, the course team posted the top 3-8 questions asked, on the forum, and requested those students connect via Skype, on Thursday, during which questions were answered live. These sessions engaged the most active students and made learning more personal and customized to individual students.

• **Professor responses.** Every week or two, TAs curated “hot topics” by figuring out which topics came up repeatedly in the forums. TAs then sent 4-7 quality questions to the professors, who then responded directly and posted responses on the forum and the Course Info page.

• **Community TAs.** There emerged about 15-20 very active users who posted hundred of comments, many of which were high quality and frequent. By promoting some of these users to become community TAs, the course was able to build effective forums and shape the community discussion.