Demographic Differences in How Students Navigate Through MOOCs

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Online education strives to bring 1-on-1, mastery-based tutoring to everyone.
Prereq: understand how people from different demographics use ed-tech
xMOOC: Coursera, edX, Udacity
How do demographics such as age and country of origin affect navigation in MOOCs?
How can we redesign MOOCs to serve more kinds of students?
METHODOLOGY

Data Analysis
4 edX courses, Fall ’12: Intro CS, A.I., Stat, Chem

Demographics
Country, age, gender, years of education

Student Intent
Only certificate earners: 11,490 (10% of total)
Navigation Overview

Certificate earners cover only ~78% of course pages

1.04 backjumps per visited page

Most backjumps were assessment -> lecture
edX certificate earners do opportunistic learning
Focus on **country** and **age**
Top 5 countries, 50% of certificate earners
Top 30 countries, 83% of certificate earners
Student-teacher ratio

Source: UNESCO Institute for Statistics (primary school data)
Sweden: 9 students/teacher

Low student-teacher ratio: Belgium, Hungary, Italy, Poland, Sweden
High student-teacher ratio: Mexico, Kenya, Nigeria, India, Pakistan

Kenya: 47 students/teacher
Multiple linear regressions

\[ Y \sim \text{student-teacher-ratio} + \text{gender} + \text{age} + \text{edu-yrs} \]

\[ Y = \{\text{coverage,}\]
\[ \quad \text{final grade,}\]
\[ \quad \text{backjumps/page,}\]
\[ \quad \text{norm. forum events,}\]
\[ \quad \text{norm. textbook events}\} \]

Report selected factors with \( p < .001 \)
Low student-teacher ratio

- Higher coverage
- More backjumps
- No significant grade differences
- No forum or textbook event differences

(Caution: generalizing over entire countries)

High student-teacher ratio

- Lower coverage
- Fewer backjumps
Low student-teacher ratio | High student-teacher ratio

- Higher coverage
- More backjumps
- Student-centric education
  - Field-independent: explorers
    [Witkin et al. 1977] [Hofstede 1986]

- Lower coverage
- Fewer backjumps
- Teacher-centric education
  - Field-dependent: observers
Mean (# backjumps / visited pages)
<table>
<thead>
<tr>
<th>Younger students</th>
<th>Older students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower coverage</td>
<td>Higher coverage (+20%)</td>
</tr>
<tr>
<td>Fewer backjumps</td>
<td>More backjumps (+20%)</td>
</tr>
<tr>
<td>Less forum participation</td>
<td>More forum participation (2x)</td>
</tr>
<tr>
<td>Fewer textbook visits</td>
<td>More textbook visits (+30%)</td>
</tr>
</tbody>
</table>

**Hypothesis:**
Older students more independent and self-directed (even controlling for country and other demographic variables)
Future work: qualitative insights
<table>
<thead>
<tr>
<th>Study Finding</th>
<th>Design Ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunistic learning</td>
<td>Rethink linearity</td>
</tr>
<tr>
<td>Variance in coverage and forum posts</td>
<td>Beyond pass/fail certificates</td>
</tr>
<tr>
<td>Explorers vs. observers</td>
<td>Adaptive scaffolding</td>
</tr>
</tbody>
</table>

**Future MOOCs: one size fits all**

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