(Dis)Engagement patterns in
Questionnaire Design for Social Surveys
University of Michigan

MOOC
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Problem Definition

MOOC completion rates are below 15%

Coursera (2013)
Problem Definition

Heterogeneity matters
#1 Given the heterogeneity of learners, what are the main patterns of engagement with MOOC components?
(Learning analytics behavior data)

#2 How do the identified engagement groups differ in their motivation, satisfaction with the course and other relevant survey measures?
(Survey data)
• 58,141 participants from all over the world have enrolled in the course so far (this analysis is limited to 3 waves=47,690).

• Course information:
  - 6 Units (Weeks)
  - Pre-Recorded Videos: several short videos for each unit
  - Quizzes (per Unit, in the last Unit: Final Exam)
  - Peer-Graded Project
Kizilcec et al. (2013) k-means clustering (L1 norm) approach:

<table>
<thead>
<tr>
<th>Student</th>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
<th>Unit 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>On track (=3)</td>
<td>Behind (=2)</td>
<td>Auditing (=1)</td>
<td>Out (=0)</td>
</tr>
<tr>
<td>B</td>
<td>Auditing (=1)</td>
<td>On track (=3)</td>
<td>Auditing (=1)</td>
<td>Out (=0)</td>
</tr>
<tr>
<td>C</td>
<td>On track (=3)</td>
<td>Behind (=2)</td>
<td>On track (=3)</td>
<td>Behind (=2)</td>
</tr>
</tbody>
</table>

- Found clusters: **completion & auditing**  **disengaging & sampling**

More satisfied

Less satisfied
Analysis – Kmeans Clustering

Adjusting Kizilcec et al. (2013):

<table>
<thead>
<tr>
<th>Student</th>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
<th>Unit 4</th>
<th>Unit 5</th>
<th>Unit 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>On track (=3)</td>
<td>Almost on track (=2)</td>
<td>Auditing (=1)</td>
<td>Out (=0)</td>
<td>Etc.</td>
<td>Etc.</td>
</tr>
</tbody>
</table>

**on track:** all assignments attempted + at least 50% of videos attempted

**almost on track:** all assignment attempted + less than 50% of videos are attempted

**auditing:** just attempting to watch videos (no assignments)

**out:** no engagement (in a particular unit)
### Data used for the further analysis:
Participants active with at least some material component in at least 1 of the units
14, 42% of all respondents  
77,88% are employed
12, 19% of all respondents
46,67% are employed
Gradual Disengagement

6.03% of all respondents
70.24% are employed

Assignments

Video Lectures
67, 36% of all respondents
58,75% are employed
## Course Survey Data

### Active Material

<table>
<thead>
<tr>
<th>Survey</th>
<th>Active with material</th>
<th>NOT active with mat..</th>
</tr>
</thead>
<tbody>
<tr>
<td>DID not participate in survey</td>
<td>94.52%</td>
<td>99.93%</td>
</tr>
<tr>
<td>participated in survey</td>
<td>5.48%</td>
<td>0.07%</td>
</tr>
</tbody>
</table>

### Cluster Participation

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Completing</th>
<th>Gradual Disengagement</th>
<th>Fast Disengagement</th>
<th>Disengaging Auditing</th>
</tr>
</thead>
<tbody>
<tr>
<td>% participated in a survey (n participants)</td>
<td>30.88% (904)</td>
<td>6.86 % (84)</td>
<td>1.82% (80)</td>
<td>0.59% (45)</td>
</tr>
</tbody>
</table>
Motivation/Goals

1 - Fast Disengagement
2 - Disengaging Auditing
3 - Gradual Disengagement
4 - Completion

Agreement item: I feel like I achieved my personal goals for this course (1-Strongly Disagree, 5-Stongly Agree)

Agreement item: I had a strong desire to take this course (1-Strongly Disagree, 5-Stongly Agree)
### Possible Problems?

1. Fast Disengagement
2. Disengaging Auditing
3. Gradual Disengagement
4. Completion

**Video Lectures**

- How did you feel about course videos (1-Poor, 5-Excellent)

**Assignments**

- How did you feel about assessments (assignments, exams) (1-Poor, 5-Excellent)
Possible Problems #2?

1 - Fast Disengagement
2 - Disengaging Auditing
3 - Gradual Disengagement
4 - Completion

Please, rate course workload (1-very light, 5-very heavy)

Please, rate course difficulty (1-very easy, 5-very difficult)

Workload

Difficulty

n=45 n=80 n=84 n=904

p<0.05
Possible Problems #3?

1 - Fast Disengagement

2 - Disengaging Auditing

3 - Gradual Disengagement

4 - Completion

Time management

I am satisfied with how I managed my time in this course, (1-Poor, 5-Excellent)
"(Dis)engagement" versus

Completion

Gradual disengagement

Fast disengagement

Disengaging auditing
Conclusion

Possibly:

Completion
- mostly employed
- good with time management
- found the right difficulty level

Gradual disengagement
- mostly employed
- could improve their time management
- report to be as satisfied with their achieved course goals as “completion” group

Fast disengagement
- could improve their time management
- are less satisfied with the assignments (because?–>)
- find the course level too easy
- seem to be less satisfied with achieving their course goals.

Disengaging auditing
- similar to “fast disengagement” group +
- seem to be less motivated (at the beginning of the course).
Conclusion

“(Dis)engagement” versus

Yes/NO

Possibly:

**Completion**
- mostly employed
- good with time management
- found the right difficulty level

**Gradual disengagement**
- mostly employed
- could improve their time management
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**Fast disengagement**
- could improve their time management
- are less satisfied with the assignments (because? - >)
- find the course level too easy
- seem to be less satisfied with achieving their course goals.

**Disengaging auditing**
- similar to “fast disengagement” group +
- seem to be less motivated (at the beginning of the course).
Further Stepps

• Alternative way of defining the trajectories across the units

• Work with more detailed web matrices (pause, re-playing behavior, etc.)

• Try alternative methods that are more appropriate for categorical data (e.g. multiple correspondence analysis).

• **The biggest PROBLEM to address:** potential bias due to non-response in course surveys. The severity of the bias and methods for bias reduction in the MOOC context is not researched (see Kizilcec 2014 on the example of weighting technique). So far, no study using multiple imputation approach.

• Without addressing the issue of survey data quality we cannot fully understand online learner heterogeneity
Thank you!