



Secondary School Students & MOOC's: A Comparison between Independent MOOC Participation & Blended Learning



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Purpose of the Study

- To compare secondary school student achievement of learning outcomes and levels of student engagement and persistence under two conditions
 - Independent engagement with a MOOC: MOOC-only group
 - Receiving teacher support while taking a MOOC: Blended-mode group
- Students identified as high school age taking the MOOC independently will be compared to “participant students”

Context of the Study

- Participant students: Independent school students taking a grade 12 Economics class
 - MOOC-only group or Blended-mode group
 - The Behavioural Economics MOOC offered by UofT on the edX platform
- Note: Students attended three weeks of MOOC. No impact on students grades in their course

Relevance

- College readiness and reach-ahead may increase success in post-secondary studies
- College readiness for all students (Gates Foundation)
- MOOCs & secondary school students
 - Reach ahead opportunities
 - Accelerated pathways through post-secondary education
- Alternative pathways to college admission
 - University of Helsinki Computer Science course as a formal entrance exam

Implications for MOOCs

- William G. Bowen, former President of Princeton, currently employed by ITHAKA Strategy and Research, actively engaged in research related to online learning and MOOCs, identified the potential for MOOCs to provide secondary school students with reach ahead opportunities and accelerated pathways through post-secondary education as one of the most promising potentials of MOOCs

Boston Review, June 13, 2013

Research Questions

- To what extent do students taking a MOOC independently and students taking a blended-mode MOOC differ in their achievement of the learning outcomes and their level of engagement and persistence with the course material?
- How do MOOC learners identified as high school age taking the MOOC independently compared to “participant students” taking the MOOC as part of a credit course in terms of their MOOC learning expectations?

Study Design

- Case study (Stake, 1995)
- Participants
 - 29 students from two sections of a grade 12 Economics class
 - Age range: 15 to 17
- Procedure
 - Randomly assigned to two groups
 - MOOC-only (n=14): Self-directed
 - Blended-mode (n=15): Three weekly tutorials
 - Registered in Behavioural Economics in Action (BE101x) on edX
 - Participated in weeks 1, 2, and 5
 - Regular classes in weeks 3 and 4 and after week 5

Curriculum Design

- Grade 12 University Preparation Level Analyzing Current Economic Issues (CIA 4U)
- Consumer Behaviour unit – utility and demand
- Incorporated content from weeks 1, 2, and 5 of MOOC
- Concentrated on Behavioural Economics and application rather than experiment design

Curriculum Design

- Weekly tutorials
- Led by classroom teacher and guest instructor
- Extended, rather than reviewed, online course content
 - Addressed student questions
 - Conducted “live” experiments in the classroom
 - Explored application of BE principles in greater depth

Data Sources

- Pre/post tests: Content knowledge
 - 10 T/F items
- Intake survey
- Clickstream data from BE101x: Oct 14, 2013 to Nov 21, 2013
- BE101x quiz results and Modified BE101x test, weeks 3 & 6

Measures

- Achievement of the learning outcomes
 - Content knowledge pre-post tests
 - Quizzes and tests
- Engagement
 - Learning and assessment resources accessed in BE101x
 - 20 lecture videos; 6 debate videos (Slides & articles could not be tracked)
 - 29 Quiz items
- Persistence
 - Completeness of BE101x activities in the 3 weeks

Data Extraction Issues

Clickstream data

- Identifiers vs URLs
- Changes in format: New fields
- `{"username": "Peter", "host": "courses.edx.org", "event_source": "server", "event_type": "edx.course.enrollment.deactivated", "context": {"course_id": "University_of_TorontoX/BE101x/2013_SOND", "org_id": "University_of_TorontoX", "user_id": 2233309}, "time": "2014-01-01T00:27:57.6343434+00:00", "ip": "201.133.93.41", "event": {"course_id": "University_of_TorontoX/BE101x/2013_SOND", "user_id": 2233309, "mode": "honor"}, "agent": "Mozilla/5.0 (iPad; CPU OS 7_0_4 like Mac OS X) AppleWebKit/537.51.1 (KHTML, like Gecko) Version/7.0 Mobile/11B554a Safari/9537.53", "page": null}`

Quiz data

Week 1

[1.1 The Week Ahead](#)

No problem scores in this section

[1.2 Behavioural Economics and Choice Architecture 4 of 4 possible points \(4/4\) 100%](#)

Practice Scores:

1. 1/1
2. 1/1
3. 1/1
4. 1/1

[1.3 Rational Choice 6 of 6 possible points \(6/6\) 100%](#)

Practice Scores:

1. 4/4
2. 1/1
3. 1/1

[1.4 Decision Points 2 of 3 possible points \(2/3\) 67%](#)

Practice Scores:

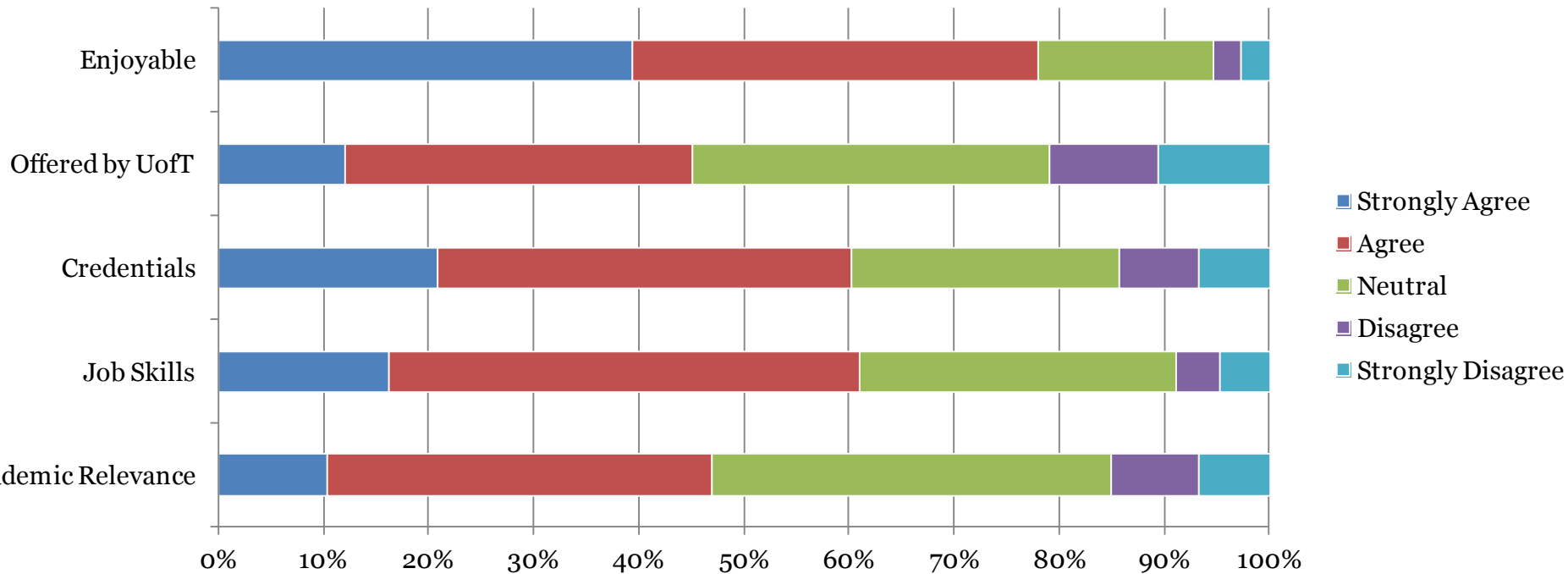
1. 0/1
2. 2/2

1.5 Debate

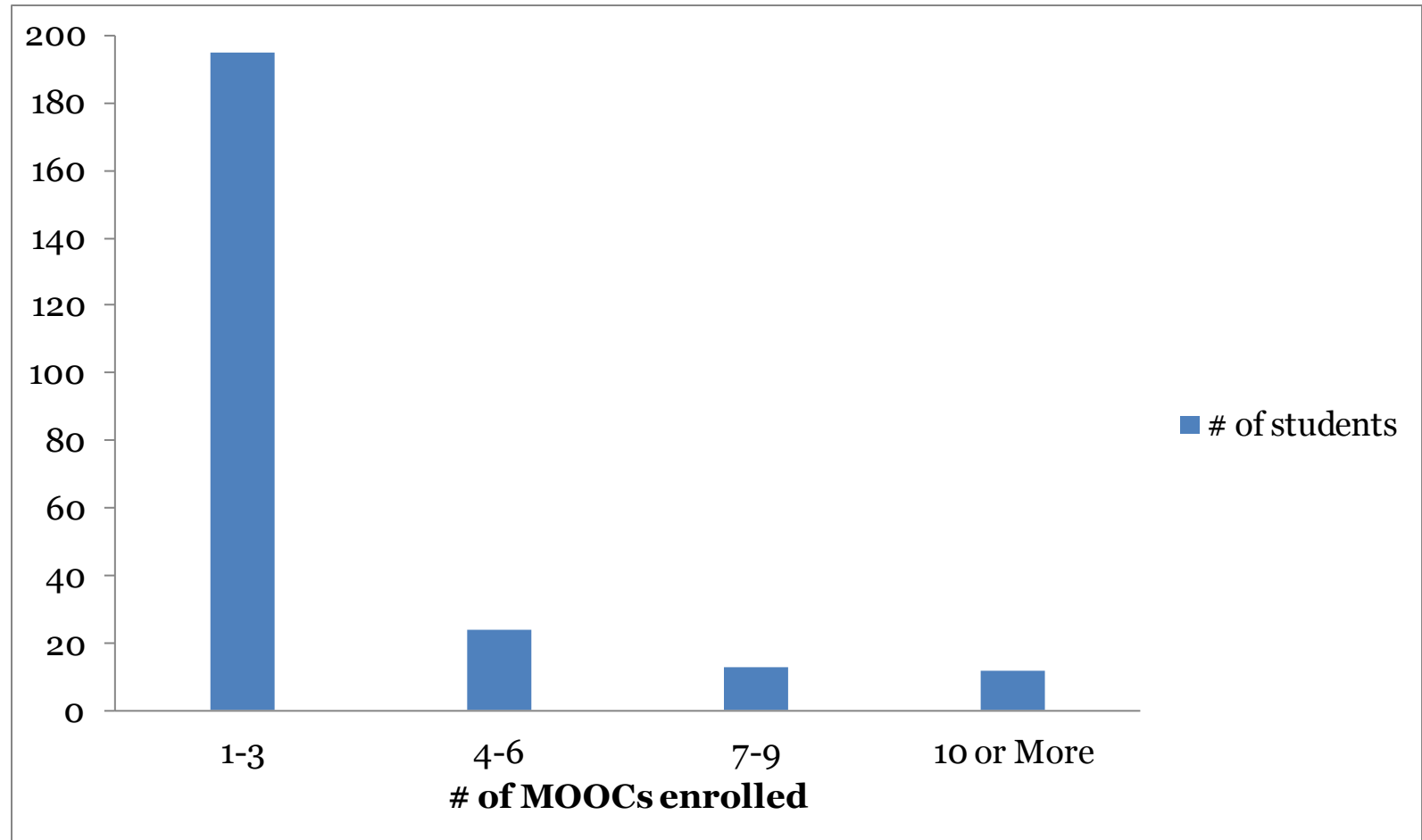
Findings: Background

Why Enrolled (All High School Students)

- 245 out of 7500 intake survey respondents

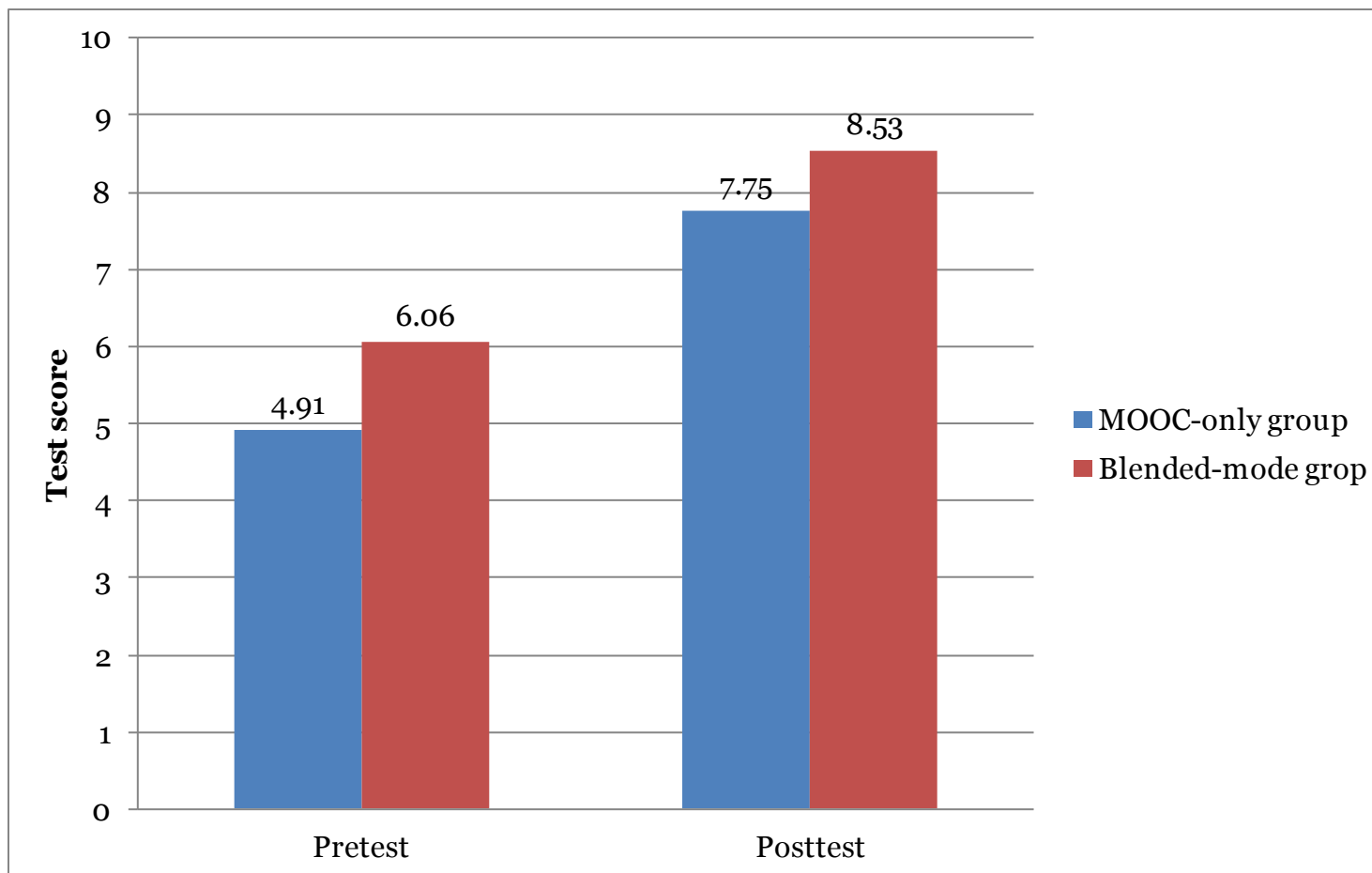


MOOC Experience (All High School Students)



Findings: Achievement

Knowledge Gain (Pre-post)

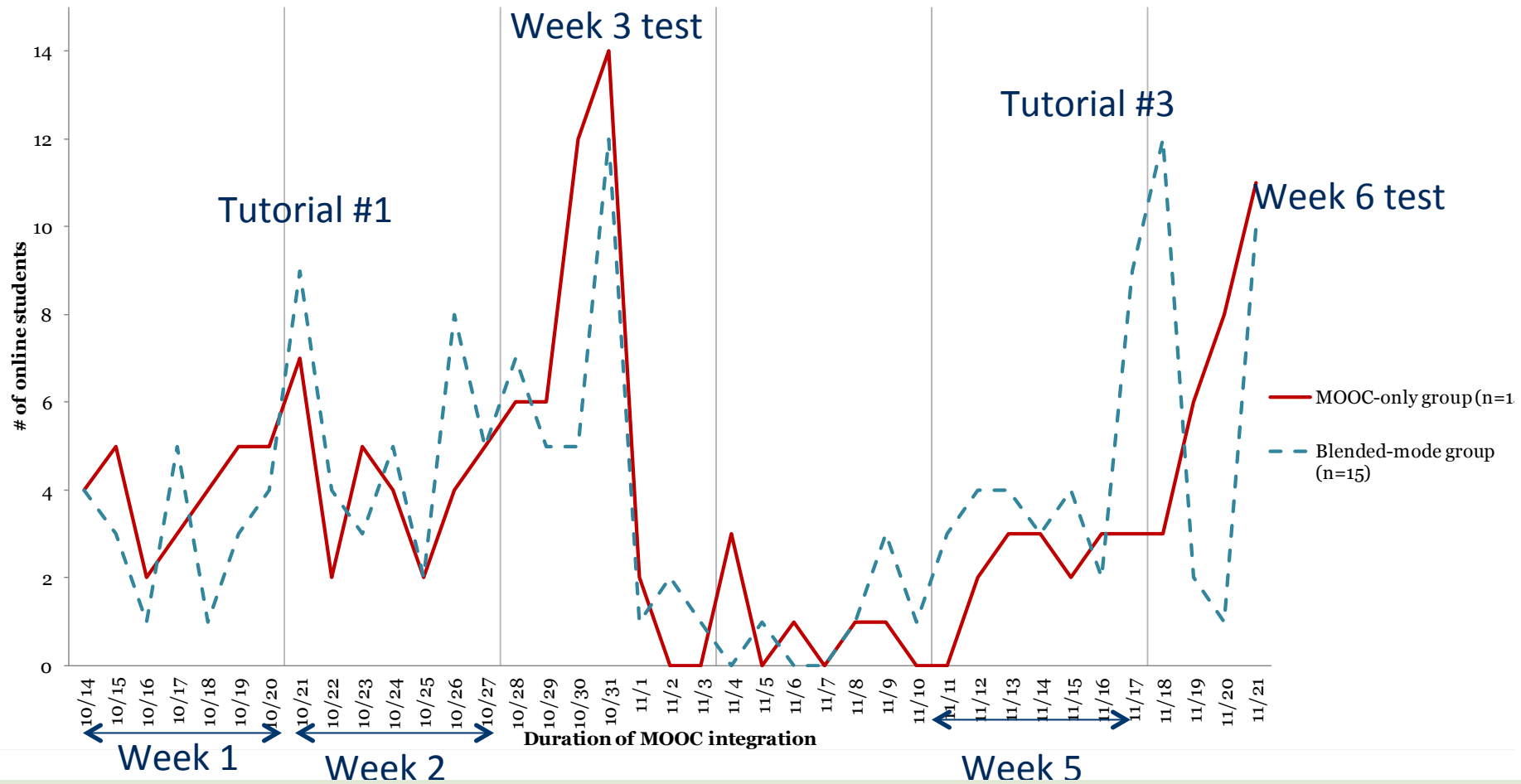


Knowledge Gain (BE101x tests)

- Week 3 test
 - Mooc-only: *Mdn*=92.86%
 - Blended-mode: *Mdn*=92.86%

Findings: Engagement & Persistence

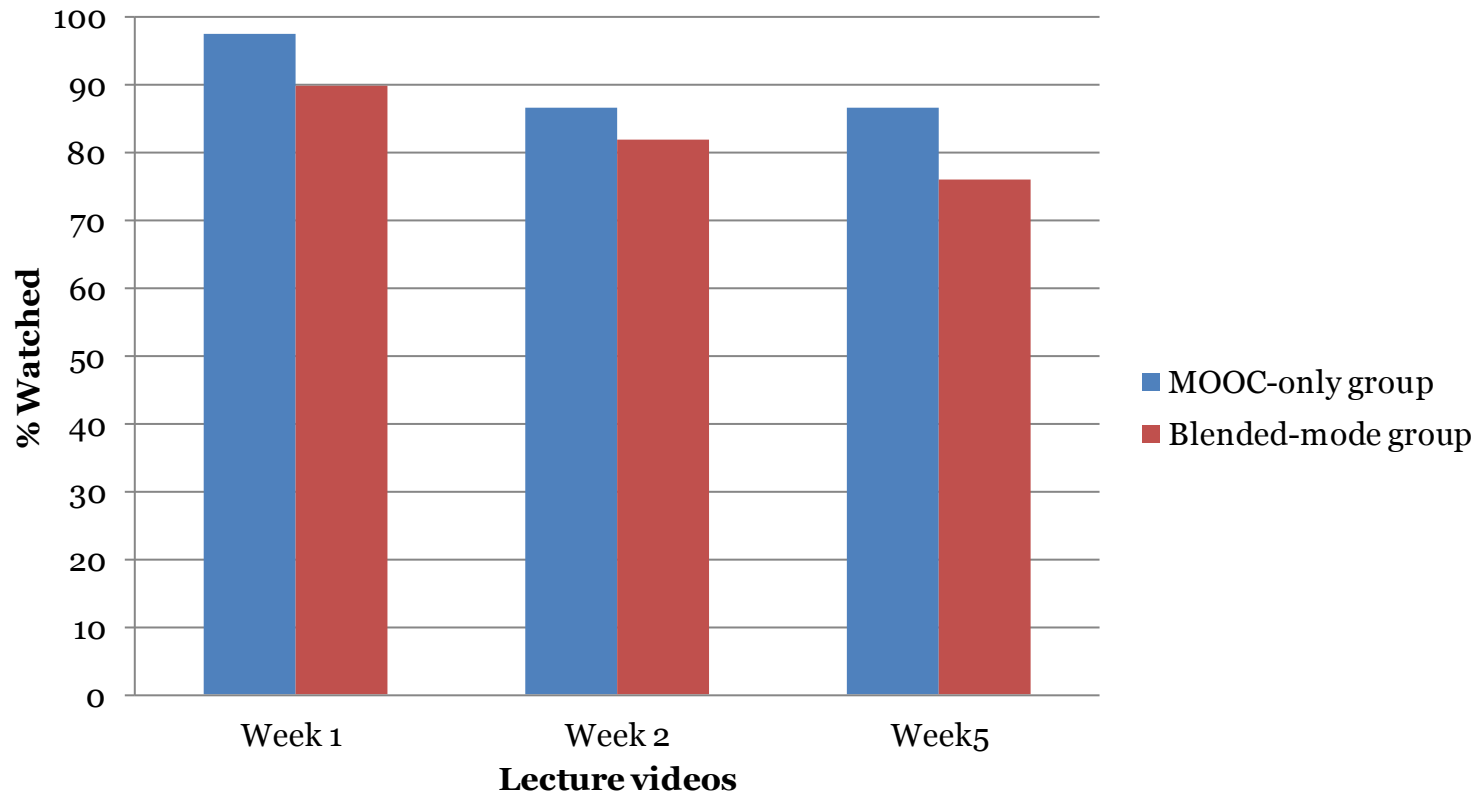
Overall Activity Trend



Use of Learning Resources

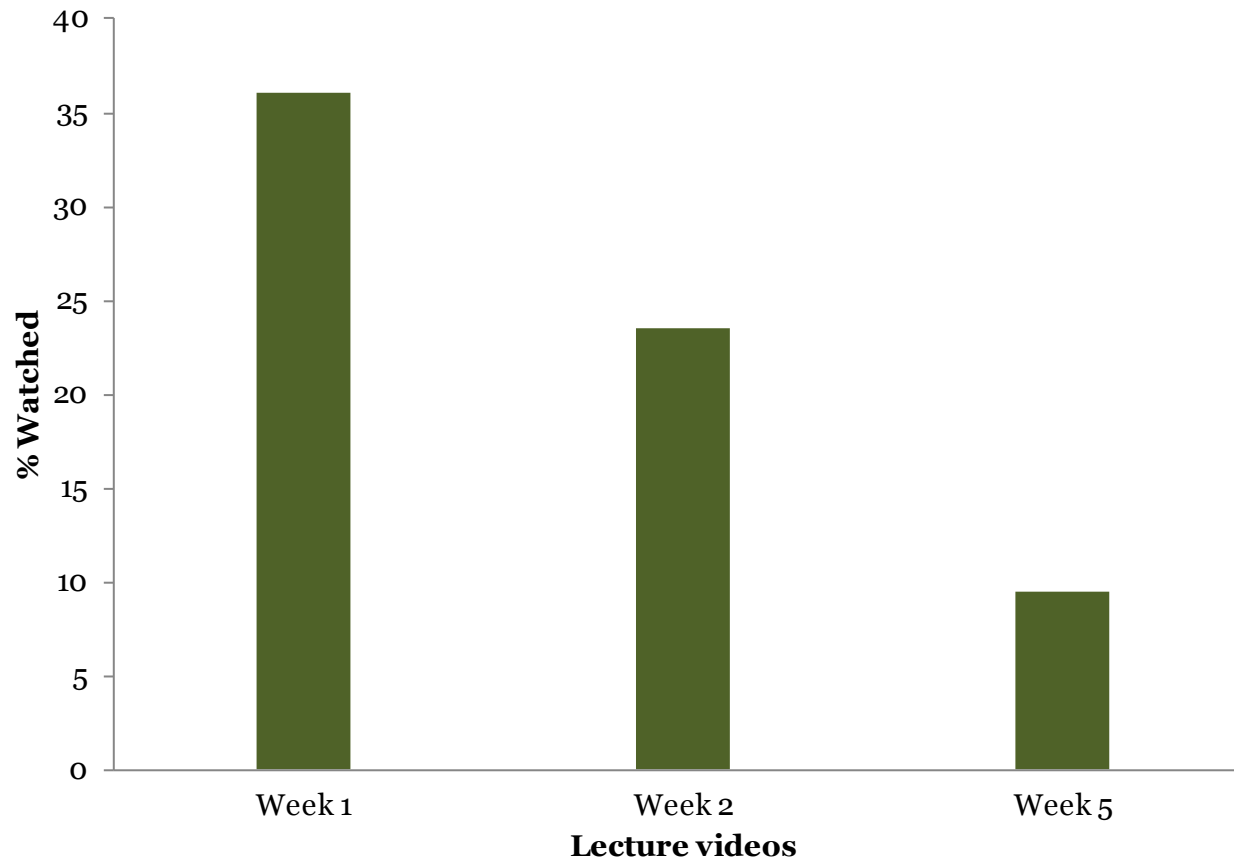
Group	Lecture Videos		Debate/Debrief Videos	
MOOC-only (n=14)	<i>M</i> =18.00	<i>SD</i> =4.33	<i>M</i> =2	<i>SD</i> =1.35
Blended-mode (n=15)	<i>M</i> =16.46	<i>SD</i> =5.42	<i>M</i> =1.8	<i>SD</i> =1.65

Access to Videos by Week



Access to Videos by Week (Other High School Students)

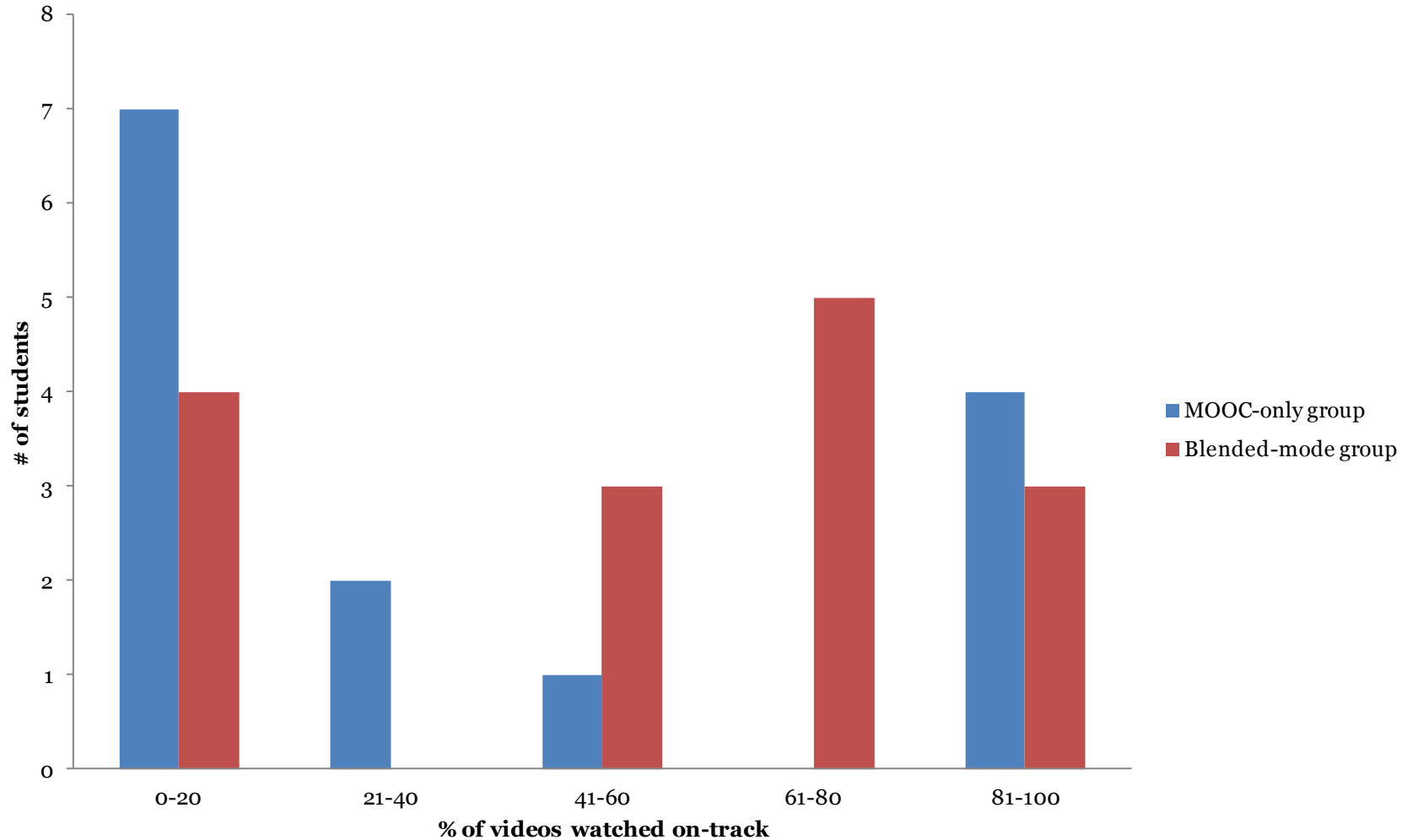
- 614 other high school students with an event in the clicklog



Staying On-track

Group	Week 1 videos	Week 2 videos	Week 5 videos
M O O C - o n l y (n=14)	36.9%	43.88%	33.67%
B l e n d e d - m o d e (n=15)	46.67%	63.81%	51.43%

Staying On-track



Quizzes

- Quizzes taken
 - Mooc-only ($M=26.43$; $SD=6.1$)
 - Blended-mode ($M=24.53$; $SD=7.7$)
- Total points
 - Mooc-only ($M=24.95$; $SD=5.98$)
 - Blended-mode ($M=23.74$; $SD=7.43$)
- Max points possible for quizzes taken
 - Mooc –only: 21.42%
 - Blended-mode: 40%

Conclusion

- Achievement: Classroom vs. MOOC assessment
- Engagement with learning resources
 - Mooc-only vs. Blended-mode group
 - How much: Slightly more
 - When: lagged behind
 - Participant students vs. other high school students
- Engagement with & persistence in assessment resources
 - Total points: MOOC-only
 - Full points gained: Blended-mode
- Lack of discussion participation
 - 44 students, 103 comments

Discussion: MOOCs in High Schools

- Contextualization to increase academic relevance
 - Engagement
- Teacher presence
 - Course pace
 - Persistence
- Implications
 - Curriculum design & assessment
 - Longevity of the integrated MOOCs
- Future research
 - Student questionnaire/interviews
 - Role of community

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