

School of Computer Science
Language Technologies Institute

Towards Support of Collaborative Reflection, Help Exchange and Group Learning in MOOCs

Miaomiao Wen, **Oliver Ferschke** & Carolyn P. Rosé

With funding from NSF, The Bill & Melinda Gates Foundation, and Google

Making MOOCs More Social

- Project and problem based learning
- Collaborative reflection and collaborative problem solving
- Community building and social support
 - Reducing attrition in MOOCs
 - Engaging under-represented students in online education
- Gateways to enduring communities of practice

Conversational Interactions in MOOCs

- MOOC data shows association between types of conversational interactions and
 - Retention/Attrition [Wen et al, 2014a, Wen et al. 2014b, Wen et al 2015]
 - Teamwork quality [Yang et al., 2015]
 - Learning [Xu et al., 2015]
- Foundation for the design of interventions that have an impact on real world MOOCs
- This talk: findings from three recent studies related to the broad vision of designing **discussion affordances for collaborative learning in MOOCs**

Discussion **A**ffordances for **N**atural **C**ollaborative **E**xchange

<http://dance.cs.cmu.edu>



MOOC Interventions

Bazaar

- Supported synchronous collaborative learning
- Opportunity for reflection and social connection

Quick Helper

- Support for effective help exchange



Data, Analytics and Learning

An introduction to the logic and methods of analysis of data to improve teaching and learning.



Ad-hoc Group Formation

BAZAAR ASSIGNMENT: REFLECTION ON THE VISUALIZATION OF THE NETWORKS (EXTERNAL RESOURCE)

[Click here to start this collaborative activity](#)



The Lobby: Week 3

Log in with your edx username.

Note that whenever you log in, you will be assigned to a new team.

If the user you are matched with does not enter the room, come back to the lobby and you will be matched with someone else.

Username

[Enter the Lobby](#)

20:09	Student1	joined
20:09	System	Hi, Student1.
20:09	System	Welcome to the matchmaker lobby. Hang on for a few minutes, we'll match you up with a team as soon as enough students join.
20:09	System	Student1, you're on Team 2.
20:09	System	Your team's discussion area is ready, Student1. Follow this link to join the discussion. After you join your team's discussion area, please follow VirtualDragan's instruction there.



Discussion

Student1 has joined the discussion.8:10:33 PM

VirtualCarolyn8:10:36 PM

In this collaborative activity, we will reflect on the use of Gephi for social network analysis with the Twitter and blog networks (Week 12) from the dataset provided in the course materials about the dataset for social network analysis. First, take a moment to introduce yourselves.

Student2 has joined the discussion.8:10:41 PM

VirtualCarolyn8:10:50 PM

When you've finished introducing each other, press the "We're Ready" button (or type "ready") to begin.

Student28:11:05 PM

Hi there, this is my first chat

Student18:11:20 PM

Me too, I joined the class late

Student1 has shared an image.8:12:16 PM

Student1 has shared an image.8:12:41 PM

Student18:12:52 PM

I pasted in a network visualization

Student28:13:09 PM

Hmmm

Student28:13:18 PM


I had trouble with the assignment, maybe you can help me

Send MessageWe're Ready

Information

Student18:12:16 PM

Student18:12:41 PM



Want to share an image? Paste its URL here!

Share Image URL

Week30



Collaborative interaction supported by a virtual agent

Positive Impact of Chat Participation on Dropout

Survival analysis

- students who made at least one attempt to participate in a chat during the first 6 weeks
- unit of analysis: each 2 day period

Dependent variable:

- drop = 1 on the last 2 day time window when at least one click was recorded (0 otherwise)

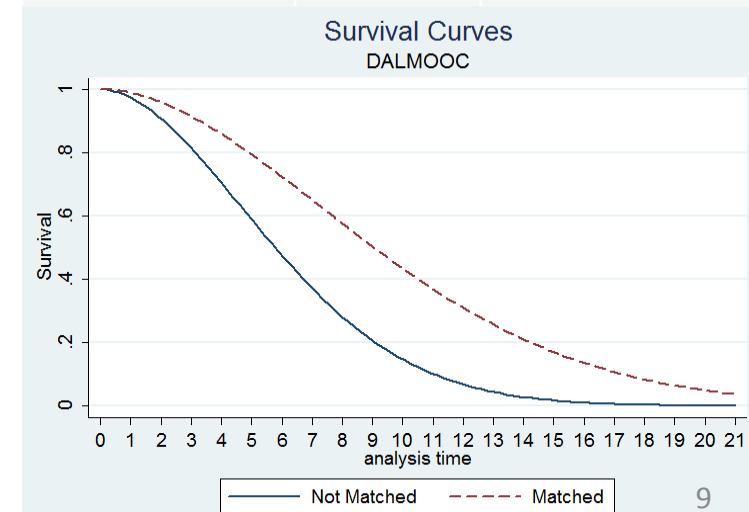
Control variables

- clicks on videos
- clicks on discussion forums

Independent variables:

- attempts to be matched for a chat
- successful match (binary)
- interaction between Attempts and Match

Independent Variable	Hazard Ratio	P Value
Video Clicks	2.38	P < .0001
Forum Clicks	.51	P < .0001
Match Attempts	2.33	P < .0001
Match Success	.44	P < .01
Interaction between Attempts and Match	.76	P < .05

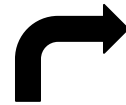


Comparative Analysis

	Social	Course Process	Course Content	Reasoning
Bazaar (week1)	18 (47.4%)	23 (60.5%)	14 (36.8%)	26 (68.4%)
Bazaar (week2)	22 (57.9%)	7 (18.9%)	21 (56.8%)	22 (59.5%)
Forums (week1)	39 (19.5%)	88 (44.0%)	53 (26.5%)	62 (31%)
Forums (week2)	32 (16.0%)	88 (44.0%)	80 (40.0%)	67 (33.5%)
Twitter (week1)	19 (19.0%)	31 (31.0%)	38 (38.0%)	28 (28.%)
Twitter (week2)	7 (7.0%)	38 (38.0%)	57 (57.0%)	35 (35%)

- Twitter and Bazaar have significantly higher concentration of **on task discussion**
- Bazaar has significantly higher concentration of **Reasoning**

Quick Helper



POST TYPE: ☐ Question ☒ Discussion Questions raise issues that need answers. Discussions share ideas and start conversations.

Quick Helper request Add a clear and descriptive title to encourage participation.

B I |

This is a quick helper request.

PREVIEW

This is a quick helper request.

☒ follow this post ☐ post anonymously

Quick Helper

If you choose at least one helper from the helpers listed at the bottom of the page, the system will send a private email message to them with the link to your discussion forum post. This is what the email message will say:

Hello *Helper*

You have been selected as an excellent person to help answer a fellow student question:

Quick Helper preview







Does the same mail is sent to helpers as seen in the preview of the quick helper request form ?

If you would like to answer this question, please [follow this link](#) to the course discussion forums.

Thank you!

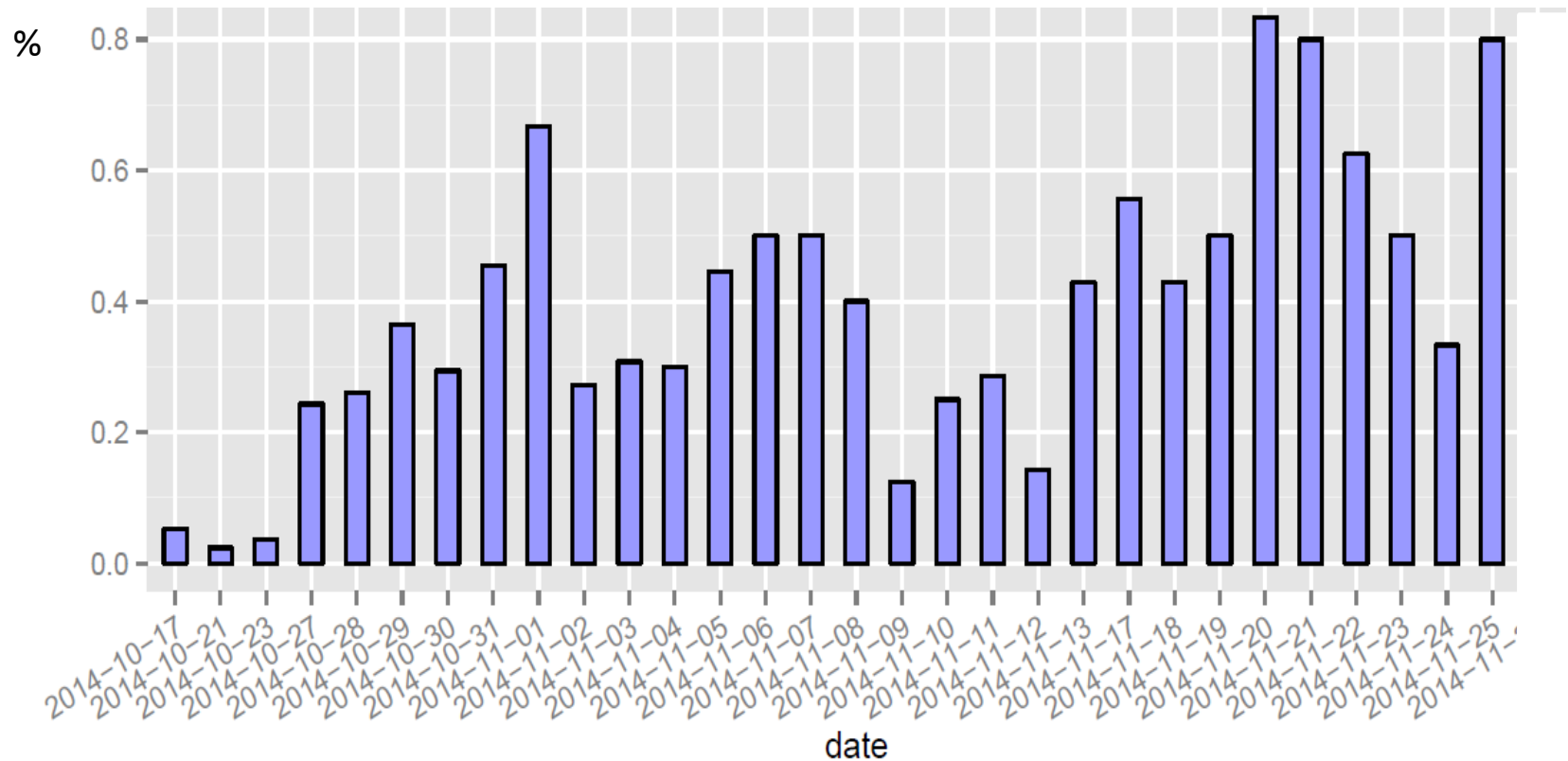
MOOC Automated Help-Matching System

These students are good matches for answering you question. Would you like to invite any of these potential helpers to your discussion thread via private message?

 <small>Name: Diyi Yang</small>	This colleague has a computer and is ready to go.	
 <small>Name: Mohammad</small>	This colleague is involved in the course.	
 <small>Name: jash Beren</small>	This colleague uses Web 2.0 technologies.	

IF YOU SELECT NONE, YOUR HELP REQUEST WILL BE POSTED TO THE COURSE DISCUSSION BOARD WITHOUT SENDING A PRIVATE MESSAGE TO ANY OF THESE POTENTIAL HELPERS.

Quick Helper Usage in DALMOOC



- **Increasing ratio of quick helper threads to total threads over time ($R = .69$, $P < .0001$)**
- Overall probability of a thread getting a reply: 81%

Towards Longer Term Group Interventions

Team-based learning improves retention

- NovoEd reported overall lower dropout rate compared to traditional MOOCs [Deamicis 2013]
- Our analysis of two courses showed that more than 50% students in a team persisted until the end of the course

Current teams fail in their teamwork

- team score based on final team project submission

	Score = 0%	Score = 50%	Score = 100%
#teams	96	58	23

Facilitating Team Formation

- Start with community-level task before forming teams
 - Counteracts homophily effect
 - Less social pressure
 - Wider range of opinions, resources, points of view
- Community engagement as evidence of who would work well together
 - transactive reasoning

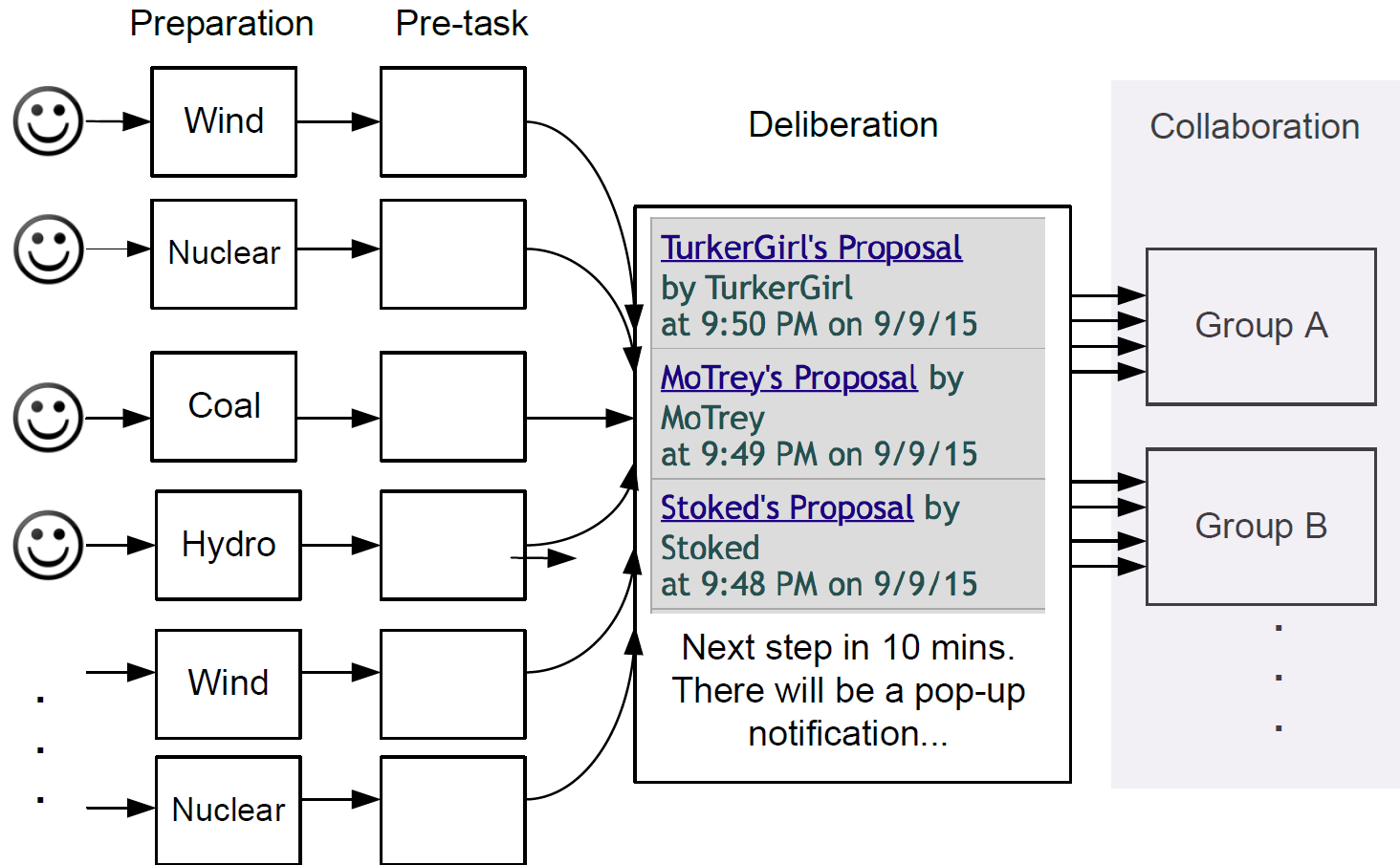
Team Formation Experiments

- In preparation for interventions in real MOOCs, we test our group formation hypothesis in Mechanical Turk [Coetzee et al. 2015]
- Rapid iteration on experimental design

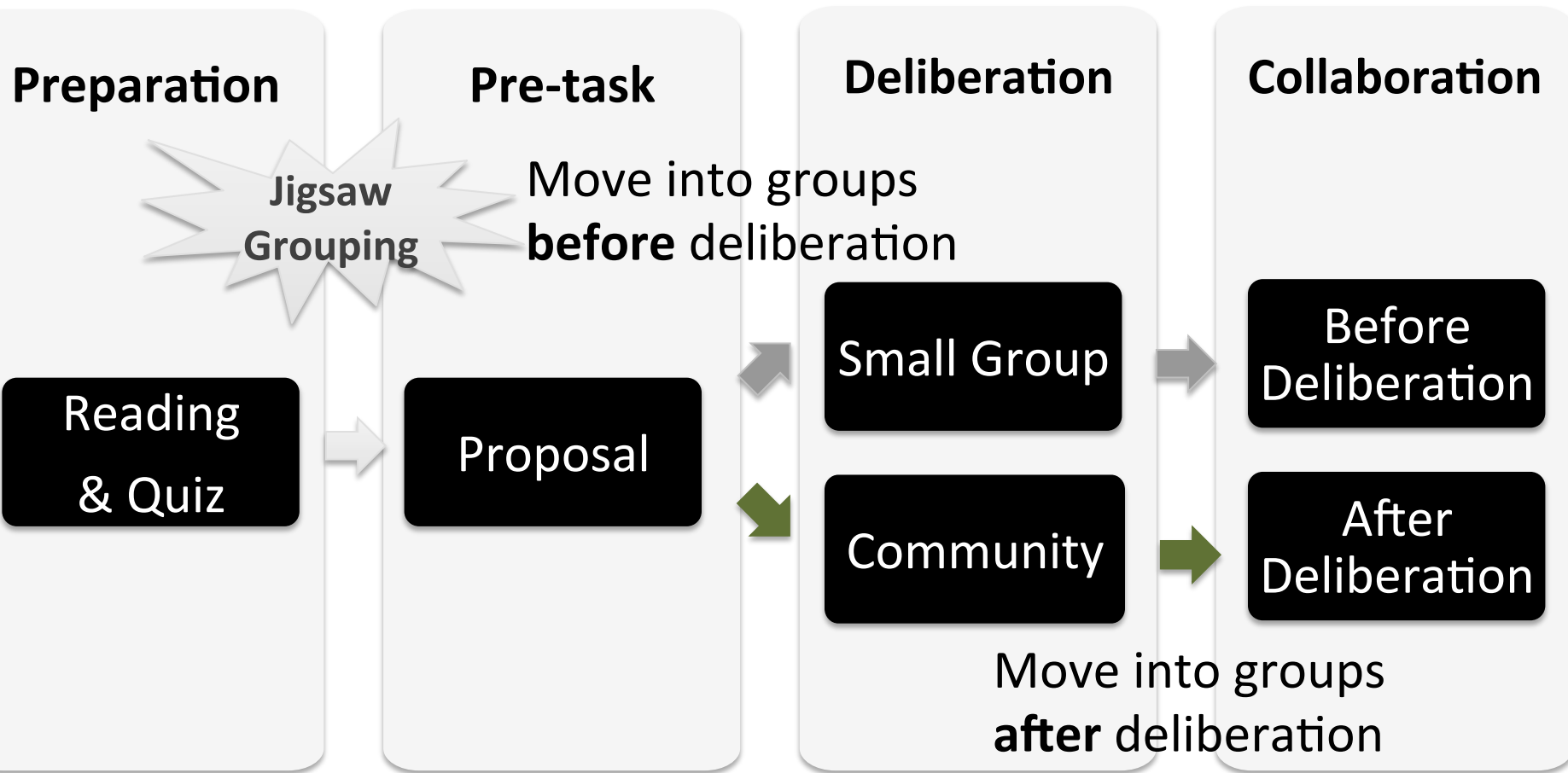
RQ1. Will exposure to large community discussions lead to more successful small group collaborations?

RQ2. Can evidence of transactive discussions during deliberation inform the formation of more successful teams?

Task Design



Experimental Manipulation #1



RQ1. Will exposure to large community discussions lead to more successful small group collaborations?

Experimental Manipulation #1

Preparation

Pre-task

Deliberation

Collaboration

lig saw

Move into groups

Readi
& Qu

Teams exposed to community
deliberation prior to group work
demonstrate better team performance
(by 3 standard deviations)

re
ation

er
ation

Move into groups
after deliberation

RQ1. Will exposure to large community discussions lead to more successful small group collaborations?

Experimental Manipulation #2

Preparation

Reading
& Quiz

Pre-task

Proposal

Deliberation

Community

Jigsaw
Grouping

Collaboration

Random
Group

Transactivity
Maximization

RQ2. Can evidence of transactive discussions during deliberation inform the formation of more successful teams?

Experimental Manipulation #1

Preparation

Pre-task

Deliberation

Collaboration

lig saw

Move into groups

Readi
& Qu

Teams exposed to community
deliberation prior to group work
demonstrate better team performance
(by 3 standard deviations)

re
ation

er
ation

Move into groups
after deliberation

RQ1. Will exposure to large community discussions lead to more successful small group collaborations?

Conclusions

- Collaborative reflection elicits higher degree of reasoning and lowers attrition.
- Social recommendation is well received by MOOC users. Effectiveness needs to be studied.
- Exposure to community-level deliberation provides more resources for group-level teamwork
- Increasing average process skills across teams improves the overall quality of produced work

Discussion **A**ffordances for **N**atural **C**ollaborative **E**xchange

<http://dance.cs.cmu.edu>

