One-slide summary

• **Motivation:** Prior research supports learning benefits of combining asynchronous and synchronous interaction (e.g. forums and chatrooms)

• **This work:** Controlled experiment in a MOOC where one group has access to a chatroom, one group has no access, and one group automatically sees the chatroom on every page

• **Results**
  - No significant effect found on grades, retention, forum participation, or sense of community
  - Low activity (8.2 messages/hr, 12% had substantive interaction)
  - Chat on every page encourages participation
Outline

• Motivation and Background
  ◦ Chatrooms/synchronous interaction

• Experimental Setup
  ◦ Randomized controlled study, MOOC integration

• Results

• Discussion/Our other recent work
Background: Chatrooms in online education

• Interaction and support in MOOCs today dominated by asynchronous discussion forums

• Synchronous chatrooms
  ◦ “providing a greater sense of presence and generating spontaneity” (Hines & Pearl 2004)
  ◦ Best when combined with forums (Ligorio 2001)
  ◦ Expected: Lower barrier to participation, rapid response time and back-and-forth interaction, better community building
Our chatroom

- Shared among all subjects, unstructured, continuously available
- Supervised by teaching assistants and other students

CHATROOMS IN MOOCS: ALL TALK AND NO ACTION
Randomized controlled experiment

Registered students (14381) → Experimental consent procedure → Experimental subjects (1344) → Random assignment

Chat available only on its own page (409) → Chat on every page (426) → No chat (509)
Implementation and MOOC Integration:

Goals

• Conducted with a single software engineering MOOC on edX (CS 169.1x “Software as a Service”, Patterson/Fox/Joseph)

• Goals
  ◦ Never leave course website
  ◦ No modifications to core edX platform
  ◦ No assistance or permission from edX required
Implementation and MOOC Integration: Details

- IRC chat server with IRC web client front end in iframe embedded in edX course website
- JavaScript placed in HTML panes in edX to automatically log user in with their current edX username
- JavaScript also performs consent procedure in overlay pane
59% of conversations had \( \leq 3 \) participants

![Bar chart showing the distribution of number of participants in conversations. The majority have 2 or 3 participants.](chart.png)
19% had only 1 participant (no response!)
Bursty activity, with spikes around deadlines
Bursty activity, with spikes around deadlines
Activity varies by time of day (hard to interpret)
Active forum and chat users partially overlap

- **319** Forum participants
- **99** Both
- **191** Chat participants
- **933** Neither

**Diagram:** Venn diagram showing the overlap between forum and chat participants.
Results: No difference found in course outcomes

• Grades
  ◦ For each assignment, found no difference in grade distributions (Kolmogorov-Smirnov, p > 0.5)
  ◦ Caveat: multiple attempts

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</table>
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  ◦ Caveat: multiple attempts

• Retention/attrition
  ◦ Median 36.8 vs 35.9 days, no significant difference (Mann-Whitney U, p > 0.06)
Results: No difference found in course outcomes

• Rovai’s Sense of Community (Rovai 2002)
  ◦ Survey measuring how much student feels like “I belong to a community that I can trust and depend on”
  ◦ 103 responses, median score of 50 vs 51 ($p > 0.2$)
Results: No difference found in course outcomes

• Forum use
  ◦ 23% of non-chat users vs. 24% of chat users posted in the forum (Fisher’s test, p > 0.7)
Results: No evidence chat lowers the bar

- Easier to send a chat message than to make a forum post
- 24% of all subjects posted in forum
- 23% of all subjects with chat access sent message to chat
- No difference found (Fisher’s test, $p > 0.7$)
Results: More participation in embedded chat

• More students active in embedded chat (31%) vs. separate chat page (14%) (p < 0.001)

• Do students in embedded chat send more messages than students with separate chat page? Median of 4 vs 3.5 messages, but not significant (p > 0.1)
Results: Surveys

• Pre-survey: 1486 responses, 45% had no prior chatroom experience, 6% used frequently

• Post-survey: 112 responses (9.2%, 7.8%, 7.5% of each group)
  ◦ Used chat primarily for answering questions about course
  ◦ Teaching assistants and students equally helpful
  ◦ “tremendously helpful”, “great to get instant feedback, quick answers, and encouragement”, “many useful and constructive real time conversations”
  ◦ Used together with forum (forum linked 24 times in chat)
Reconciling results

• Good anecdotes but no significant difference in outcomes?

• Possible explanation: low participation
  ◦ Sending chat messages predicted longer retention (45.1 vs 37.9 days, $p < 0.001$), but self-selected
  ◦ 28% ever sent a message
  ◦ If 19% of conversations had only 1 participant, how many of those 28% had real substantive participation in chat? (and how to define this?)
Results: Substantive participation

• Categorized active chat users based on kind of interactions they had

• Categories in priority order:
  ◦ **Acknowledged**: asked question, received response, acknowledged response
  ◦ **Answerer**: responded to others’ questions
  ◦ No acknowledgement
  ◦ No response
  ◦ Socializer
  ◦ Greeter
  ◦ Tester
Results: 12% had substantive participation

- 17% of embedded chat users had substantive participation vs 6% for separate chat page (2.8x)
Discussion: Recommendations

• Should you use chat?
  ◦ No evidence of harming student outcomes
  ◦ Engages some students that don’t post in forums
  ◦ Strong anecdotal praise from survey respondents

• How to integrate chat into your course website?
  ◦ Pervasive, highly-visible
  ◦ Good models: Facebook chat, Google+ chat, Twitch.tv chat
Models for good chat UIs: Facebook chat

CHATROOMS IN MOOCS: ALL TALK AND NO ACTION
Models for good chat UIs: Facebook chat
Models for good chat UIs: Twitch.tv
Models for good chat UIs: Twitch.tv
Discussion: Increasing participation

• Low participation is a possible reason we failed to find significant benefits

• Possible strategy: Increase participation
  ◦ Increase number of students (network effect: more activity, better chance of a timely response)
  ◦ Use pervasive design for all subjects with access to chat
  ◦ Options for anonymity, chatrooms for other languages
Our other recent work

• Leverage communities for learning

• Reputation systems in MOOC forums
  ◦ Presented at CSCW in February
  ◦ Similar controlled study, with and without reputation system
  ◦ Similar results: no significant effects on learning outcomes, but quicker/more numerous responses with rep. system

• Peer learning chat (in progress)
  ◦ Students discuss questions in chat in small groups
  ◦ Early work with Turk simulations shows users enjoy using it
  ◦ Planned to be deployed in a MOOC
Summary

• Controlled experiment looking at benefits and design of chatrooms in MOOCs

• Results
  ◦ No significant effect found on grades, retention, forum participation, or sense of community
  ◦ Low participation (12% had substantive interaction)
  ◦ Chat on every page encourages participation

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