



Sociotechnical Capital and Situated Knowledge in Online Communities of Practice

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Online CoPs May Overcome Limited Opportunities to Interact with Colleagues

- **Competing demands leave little time for community building among teachers (Hollins et al., 2004)**
- **In rural areas, opportunities further constrained by small numbers and high turnover (Lowe, 2006)**
- **Professional development (PD) opportunities for science teachers often insufficient**
 - **Lack of local PD (Sherman, Byers & Rapp, 2007)**
 - **Short-lived, lack continuity, not context-specific (e.g. Corcoran, et al., 1998; Garet et al., 2001; Schlager & Fusco, 2003)**
- **Limited research on CoPs in this context**

Sociotechnical Systems Theory Provides the Overarching Study Framework

- **Reciprocal influences of technological and social systems (Bikson & Eveland, 1991, 1996; Ciborra, 1992)**
 - **Technical systems can change social systems**
 - **Work groups can change technical systems**
- **Sociotechnical capital (Resnick, 2002) builds on Putnam's (2000) concept of social capital**
 - **ICTs have unique capabilities to generate productive social relations not dependent on physical collocation**

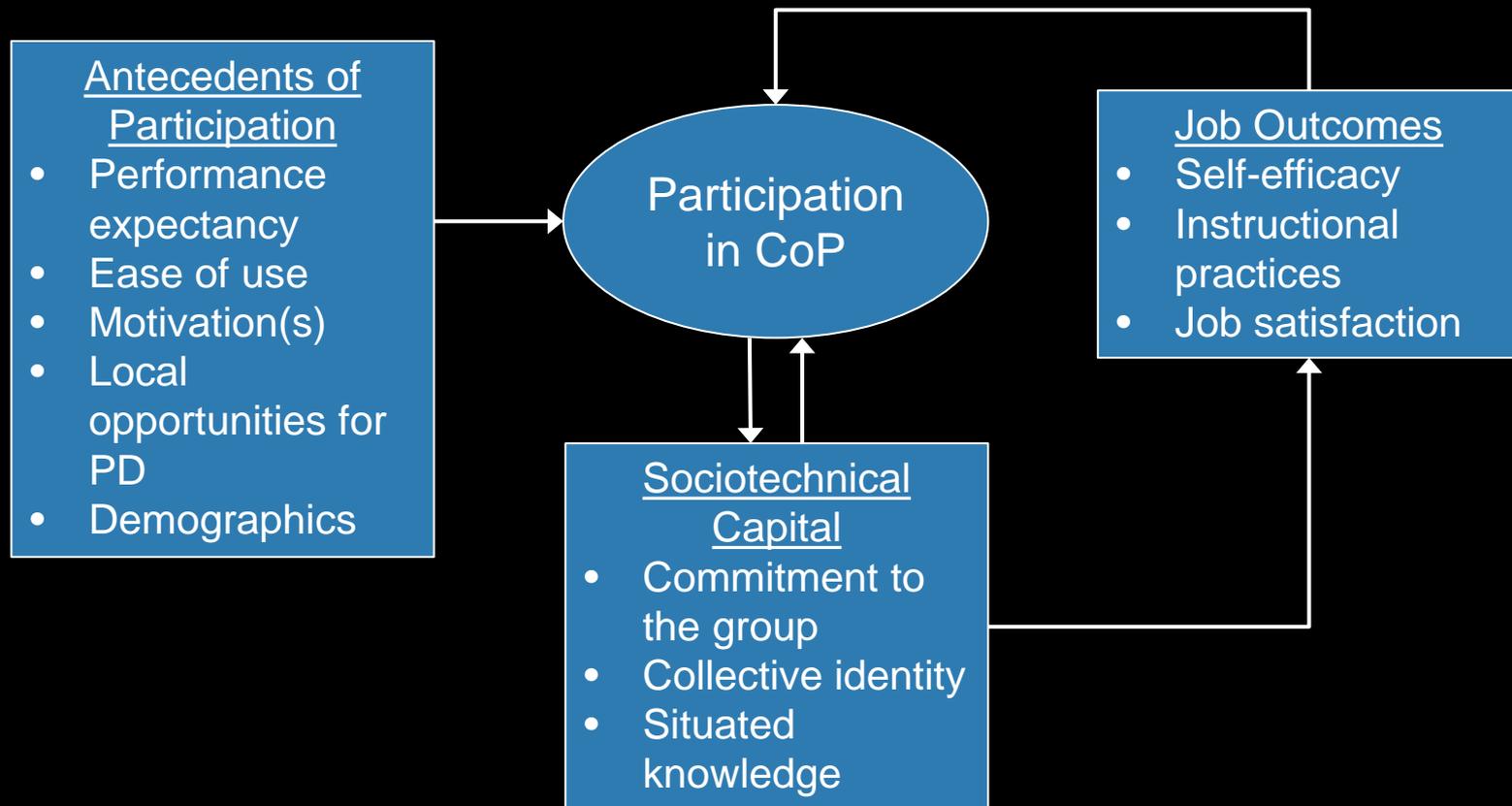
Study Draws on Other Bodies of Research

- **Technology acceptance**
 - Adoption influenced by performance expectancy, effort expectancy, facilitating conditions (Venkatesh et al., 2003)
- **Communities of Practice**
 - Online CoPs increase interaction among members (Constant et al., 1996; Resnick, 2002; Wellman, 1997)
 - Interaction → development sociotechnical capital (e.g., Henri & Pudelko, 2003; Lave & Wenger, 1991; Ren et al., 2012; Resnick, 2002; Wang et al., 2008; Wenger, 1998)
 - e.g., collective identity, commitment to the group, situated knowledge

Participants' Language Helps Build a Sense of Community and Sociotechnical Capital

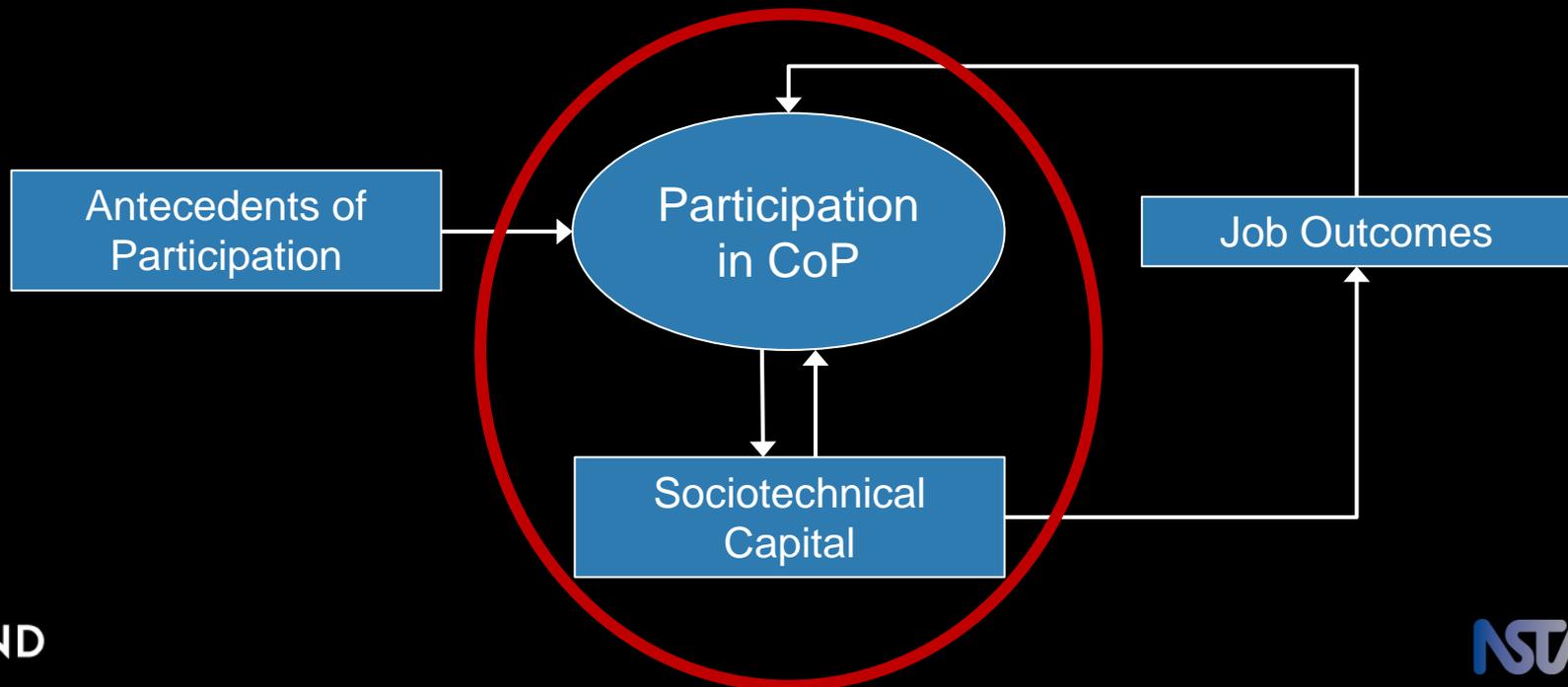
- **“We-ness” (Fayard & DeSanctis, 2010) is reflected, in language such as**
 - **Collective pronouns**
 - **Introducing oneself**
 - **Recognizing and welcoming newcomers**
 - **Offering thanks or positive feedback**
 - **Building a shared history by referencing others’ responses or expertise (see also Kraut et al., 2008)**
 - **Sharing personal experiences or “stories” (Brown & Duguid, 1991; Gray, 2004)**
- **The nature of interactions, climate is important to attracting and retaining newcomers (Ren et al., 2007; Kraut et al., 2008; Wang et al., 2008)**

Our Model Posits Antecedents and Consequences of Participation in Online CoPs



Today's Talk Focuses on Participation and Sociotechnical Capital

- How do participants generate sociotechnical capital?
- How does sociotechnical capital affect resource use?
- How does participation and sociotechnical capital differ for CoP newcomers and old-timers?



We Investigate the Research Questions with Participants in NSTA Learning Center (LC)

- **LC provides variety of professional development resources – individual and collaborative**
- **Study incorporates life sciences (LS) and physical sciences (PS) communities**
- **We use mixed methods and longitudinal design**
 - **Surveys of LC members in 2012 ($n = \sim 700$) and 2013 ($n = \sim 500$)**
 - **Web analytics: Survey participants' individual and collaborative activities; resource paradata**
 - **Content analysis of LS & PS online discussion forums over 11 months; 670 messages in 56 threads**
 - **Interviews of subset of survey participants**

Participants Generate Situated Knowledge Through Reviews/Ratings of Resources

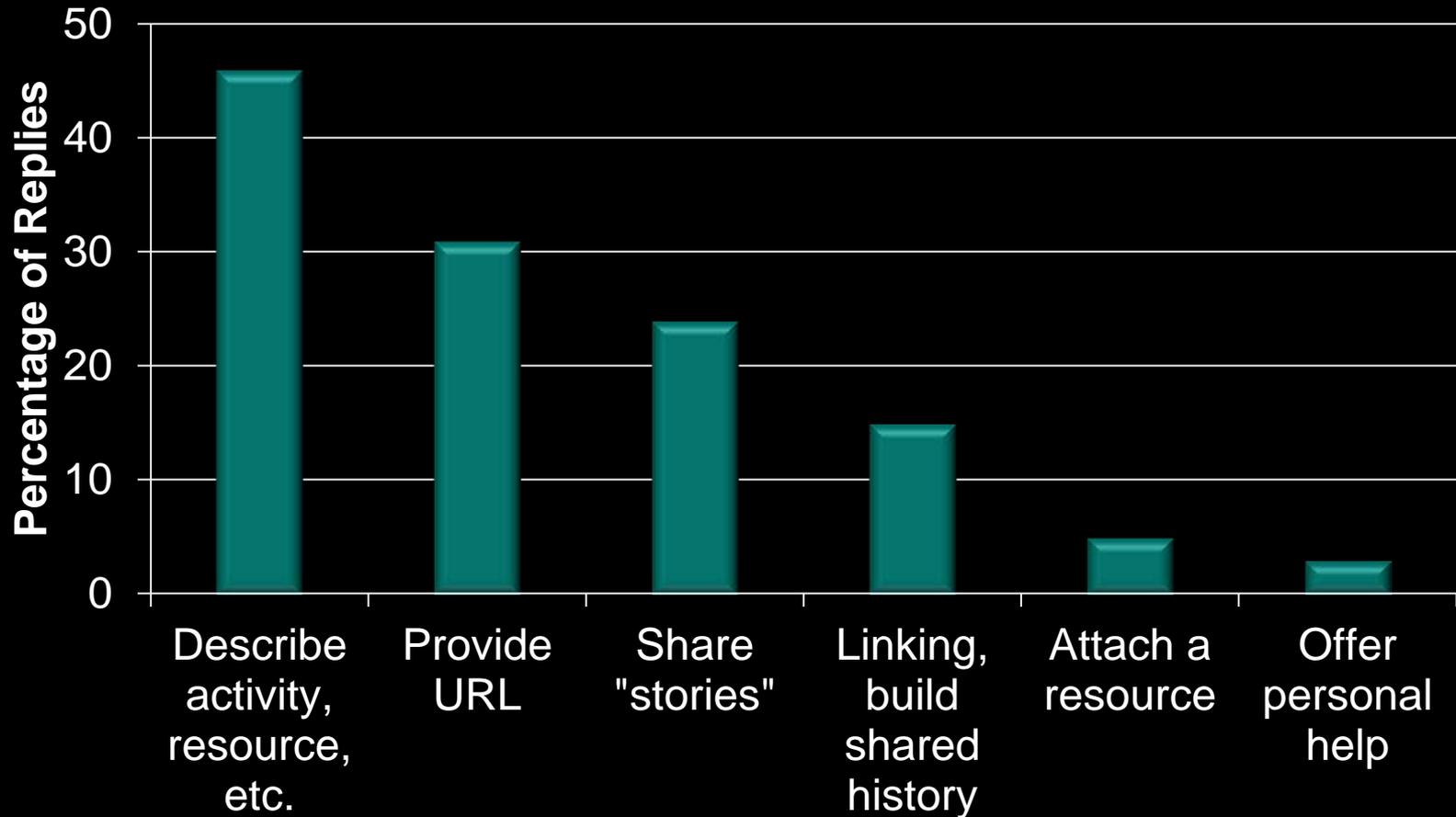
- 3750 resources, 44% were reviewed
- Resources with reviews are much more likely to be used, e.g.,
 - Launched or downloaded: $M = 165$ vs. 14
 - Added to personal library: $M = 285$ vs. 39
- Number of reviews, but not ratings, affects uptake

Variable	B	Adj. R^2
Number reviews/ratings	.65***	.41***
Average rating	-.08	
Days available	.015	

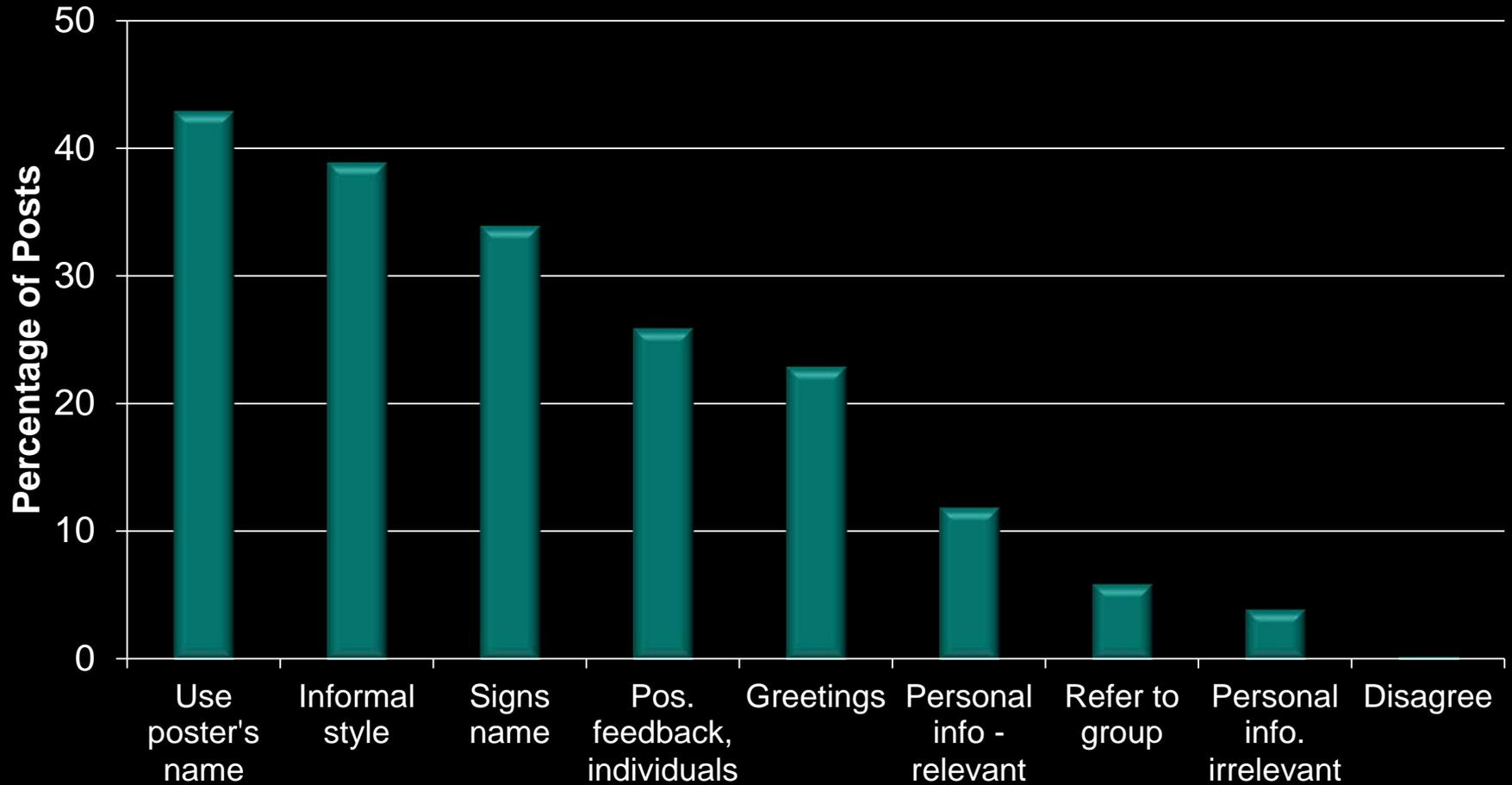
*** $p < .001$

- Limited variability in ratings may account for result, $M = 4.6$ out of 5 ($SD = .6$)

Participants Build Sociotechnical Capital in Discussion Forums through How-tos, URLs, Stories, & Creating Shared Histories



Members' Language Reflects Strong Sense of "We-ness"



Many Replies Demonstrate “We-ness”

Thanks for sharing, Helen! That was an ideal way to incorporate movies into the classroom. I used to use the scene from Shrek where he's arguing with Donkey about ogres having layers (like an onion) to introduce the layers of the earth...it was so familiar to students they allowed themselves to be sucked right into the lesson every time. Just for fun, here's the link to the latest [url=<http://www.nsta.org/publications...>] Thanks again! Kendra

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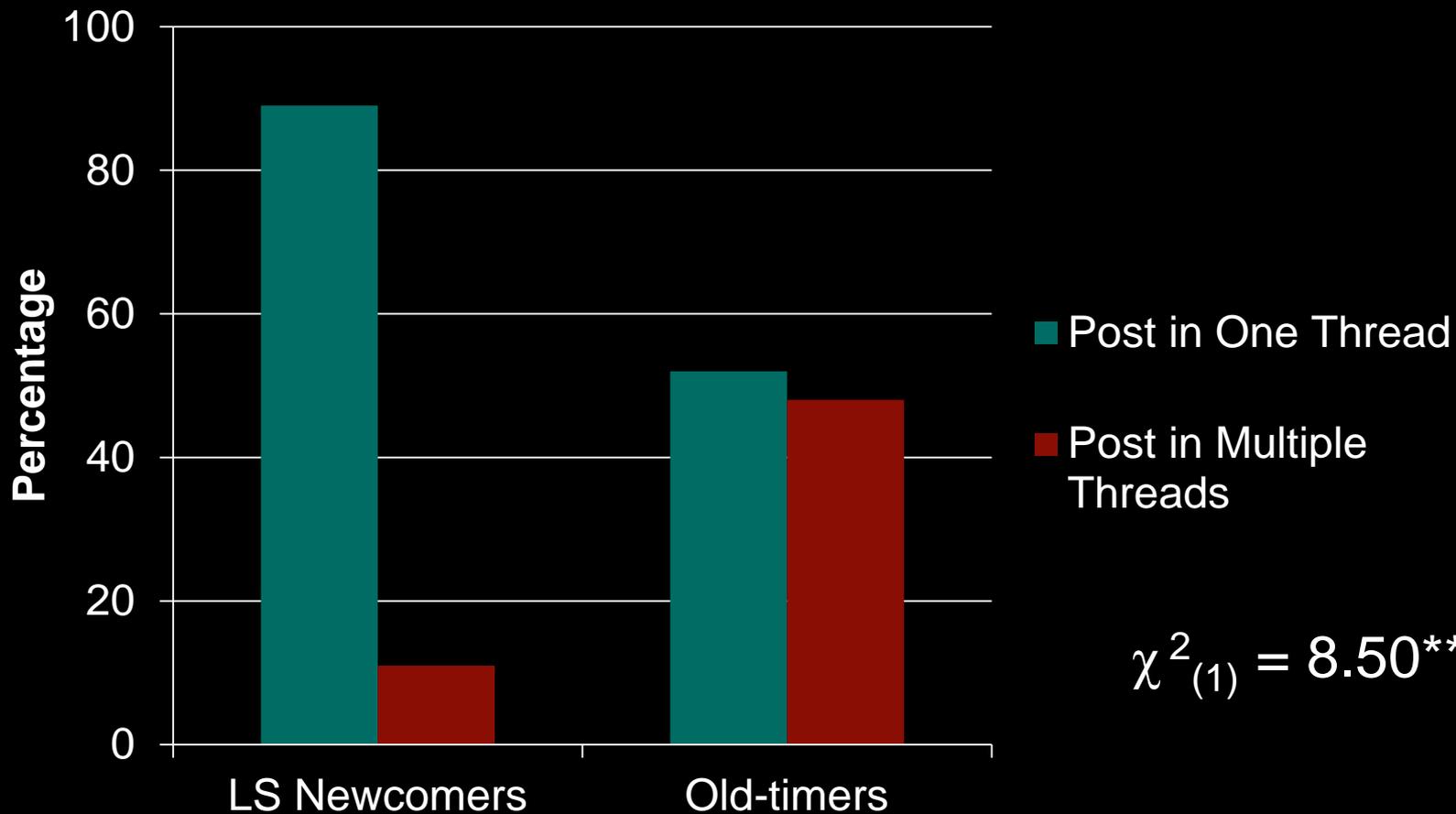
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■ = Pos. Feedback, individual ■ = Greeting ■ = Story
■ = Style ■ = URL ■ = Signs name

Newcomers and Old-timers to LS and PS Forums Differ in Participation

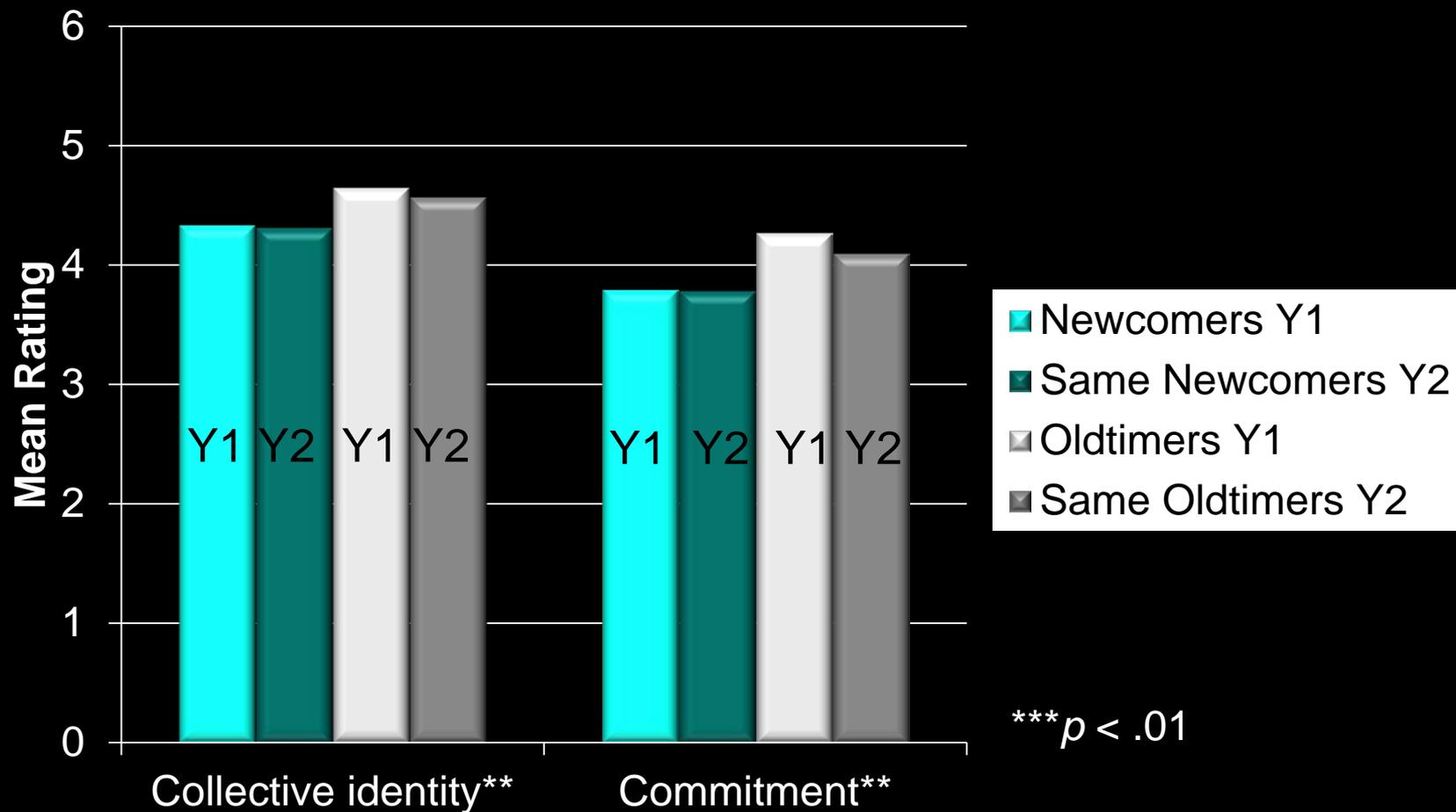
- **Newcomers:**
 - Comprise 20% of forum participants
 - Post 15% of requests and 3.5% of replies
- **Old-timers typically welcome newcomers who identify themselves as such**
- **Number of replies in a thread is not associated with newcomer status of the initial poster**

Newcomers vs. Old-timers Much More Likely to Post in Only One Thread



$$\chi^2_{(1)} = 8.50^{**}$$

Newcomers at Y1 Report Lower Collective Identity and Commitment and Do Not “Catch Up” by Y2



Summary

- **Through collaborative activities, participants generate sociotechnical capital**
 - Attitudes
 - Situated knowledge
- **CoP climate is extremely welcoming, friendly**
- **Newcomers are attracted to CoPs but many do not remain engaged**

Implications for Practice and Research

- **Newcomers engagement**
 - Outreach by CoP mentors
- **Balance between positive climate and useful contributions**
 - How sound are members' contributions?
 - How does constructive feedback affect teaching practices and retention of community members?

Research in Progress will Assess Predictors and Consequences of Participation

