From Face-to-Face to Online: Considerations for a Social Capital Design to Scale Science Teacher Access to High-Quality PD

Susan A. Yoon, Graduate School of Education, University of Pennsylvania, yoonsa@upenn.edu
Katherine Miller, Graduate School of Education, University of Pennsylvania, kmmiller@gse.upenn.edu
Jooeun Shim, Graduate School of Education, University of Pennsylvania, jshim@gse.upenn.edu
Daniel Wendel, Massachusetts Institute of Technology, djwendel@mit.edu
Ilana Schoenfeld, Massachusetts Institute of Technology, ilanasch@mit.edu
Emma Anderson, Massachusetts Institute of Technology, eanderso@mit.edu
David Reider, Education Design, david@educationdesign.biz

Abstract: This research investigates an approach to improving science teacher's access to high-quality PD. Working with a small number of teachers, this exploratory study details how we combined social capital mechanisms with essential teacher learning and PD requirements to overcome existing challenges in the delivery of a PD course in a fully online asynchronous platform. Findings reveal comparably high satisfaction and usability of course materials as compared to previous face-to-face PD. Teachers also articulated positive experiences from the intentional social capital course design in the areas of tie quality, depth of interaction, and access to expertise. However, the development of trust among teachers was harder to construct.

Introduction and theoretical considerations

This work was built on known characteristics of high-quality face-to-face PD for science teachers that included, teacher's hands-on training, aligning with teaching contexts, exposure to scientific practices, and working with teachers as collaborators Findings from our previous studies (e.g., Yoon et al., 2017) revealed high teacher satisfaction, high curricular utility, and increased student participation and learning outcomes. Strategic efforts to build teacher's social capital in addition to building teacher's human capital also improved their teaching. We were encouraged to consider how to scale to reach more teachers. Merritt (2016) noted that among the highest concerns articulated by teachers for improving practice is the need for more and flexible time. Peltola et al. (2017) highlight a dearth of access to professional peers. This report and others suggest that online PD has the potential to supplement local, in-person experiences. In this research, we investigated the application of an online social capital design asking: To what extent can a fully asynchronous PD course constructed through a social capital design deliver high-quality PD? There is already research that can inform us on strategies for building networked teacher communities such as making practice public (Lieberman & Mace, 2010), multiple options for knowledge sharing, the development of trust, and highlighting member expertise (Booth, 2012). This can also be collectively described as development of teacher social capital (e.g., Yoon & Baker-Doyle, 2018). As opposed to teachers' human capital which is a focus on developing knowledge and skills within an individual, a focus on social capital develops teaching capacities that can be acquired through direct and indirect relationships in social networks. Coburn and Russell (2008) offer a useful categorization of social capital characteristics that include: tie quality, trust, depth of interaction, and access to expertise.

Methodology

This work was funded to examine the ability to scale high-quality PD on a MOOC platform. However, in this proof-of-concept study, we worked with a small number of teachers to examine the impact of design choices that frame participation through social capital and teacher learning that could eventually support PD at larger scales. Our task in the online PD delivery mode was to replicate the high levels of satisfaction, confidence, and engagement with the StarLogo Nova modeling curricula. We developed six weekly online modules that mirrored the topics that were investigated in the face-to-face PD. With respect to designing for the characteristics of high-quality PD and teacher learning through building social capital online, Table 1 outlines details of the first category of design choices. The other three categories will be presented in the poster.

Table 1: Considerations for social capital plus PD and teacher learning that led to design choices

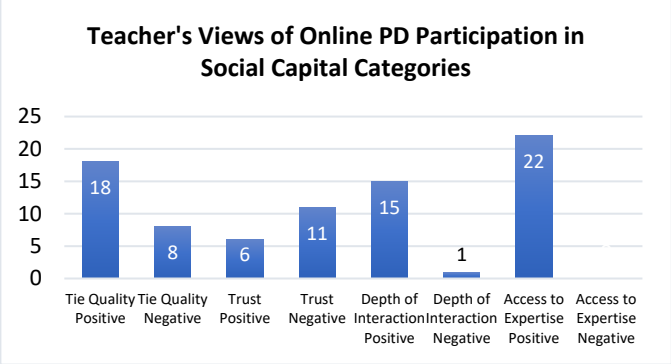
Social Capital Category	PD and Teacher Learning Characteristics	Design Choice for Online Delivery
Tie Quality	Building relationships	• Online profiles to share professional and personal information, e.g., *Write a post that describes your background (e.g., how long you have taught, unique skills or knowledge*

		that might interest your classmates). After you have responded, use the forum to connect to a couple of other course participants by clicking "reply" to comment on their posts.
	Peer-to-peer support	• Seeding norms of support, e.g., *In the Discussion Forum, briefly discuss how one example impacted your thinking about systems. After you have responded, read a couple of other posts and click the heart icon for any that resonate with you.*

We worked with eight teachers from different geographic locations around the northeastern part of the U.S. Of the eight teachers, seven were female and one was male. Teaching experience ranged from 0 to 20 years with an average of 8.4 years of experience. We collected two data sources: PD satisfaction surveys and teacher post-course experience interviews. The survey probed experiences with the course resources in terms of course satisfaction. Results from two previous implementations of the face-to-face PD were also used for comparison. Individual post-course interviews were conducted with teachers to gather information about their participation.

Results and discussion

Findings from the usability survey showed that the online teachers on average rated all 18 Likert-scale items between 4.5 and 5, which indicated very positive PD experiences. These scores were comparable to scores from previous face-to-face PD. The teacher interview analysis showed 26 comments related to the category of Tie Quality; 17 related to the category of Trust; 16 related to the category of Depth of Interaction; and 22 related to the category of Access to Expertise. The figure below shows the breakdown in terms of positive and negative comments in each category.



These findings provide encouragement that through a social capital and teacher learning framework, we may be able to offer high quality PD in a fully asynchronous online mode.

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