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Using Social Media to Extend Online Professional Development: Investigating Teachers' Fulfillment of Personal Interest and Self-Efficacy on WhatsApp

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Abstract: With teachers increasingly learning in asynchronous online environments, social media may create opportunities to supplement and capitalize on valuable social aspects of teacher learning. However, literature on social media's role in professional development (PD) remains in its infancy, and more research is needed to understand the potential benefits of social media within formal PD contexts. In this study, we examine the experiences of six high school science teachers that participated in a WhatsApp group offered as a long-term extension of an online summer PD. Interest development and teacher self-efficacy lenses were applied to analyze interview, survey, and WhatsApp discussion data for these teachers. The analysis uncovered that the WhatsApp group (1) provided these teachers with access to personalized social experiences that met their interest-appropriate goals and needs and (2) scaffolded mastery and vicarious experiences while providing opportunities for verbal persuasion to support self-efficacy development.

Introduction

Asynchronous online professional development (PD) is increasingly occupying a central role in teachers' continued professional learning (e.g., Parsons et al., 2019). These online experiences allow teachers to bypass geographical and temporal constraints at a low cost, while still delivering robust learning outcomes and improved professional practices (e.g., Fishman et al., 2013). However, optimal learning for teachers is reliant on social interactions that encourage peer-to-peer support, and online learning contexts may inhibit these collaborative opportunities (Alterman & Harsch, 2017; Lieberman & Mace, 2010). Additionally, effective teacher learning and long-term improvement of teaching practices is dependent on sustained engagement with PD content and materials (Desimone & Garet, 2015). Given these considerations, social media may present one promising avenue for supplementing and capitalizing on social interaction within online PD experiences, while offering continued opportunities for learning and support throughout the entire school year (Goodyear et al., 2014; Greenhow et al., 2020). Social media platforms are increasingly being integrated into formal PD experiences (e.g., Zhang et al., 2017), but research on social media's overall impact on professional learning remains in its infancy (Luo et al., 2020). As Greenhow and colleagues (2020) argue, there is a need for more research to understand social media's contribution toward teacher learning and long-term professional growth within the context of PD design.

In this study, we examined a professional WhatsApp community connected to an asynchronous online PD for high school Biology teachers. Due to social media's capacity for providing long-term and on-going support to teachers (e.g., Blonder & Rap, 2017; Goodyear et al., 2014), as well as its potential for cultivating and supporting teachers' professional identity and beliefs (e.g., Robson, 2017), we posit that two theoretical frameworks can aide in understanding the benefits of integrating WhatsApp into the design of PD: interest development (Hidi & Renninger, 2006) and teacher self-efficacy (Blonder et al., 2014). Applying these lenses, we examined the experiences of six teachers that participated in the WhatsApp group, and we asked the following research questions: (1) how did participation in the WhatsApp group impact the experience and professional growth of PD participants, and (2) what does this suggest for the potential benefits of WhatsApp groups in formal PD more broadly?

Theoretical considerations

Teacher learning and social media

Social media provides teachers with a variety of potential benefits. By accessing professional communities, teachers can engage in dialogue with mentors, crowdsource problem-solving, or receive peer guidance and resources related to teaching practices (Hashim & Carpenter, 2019). Social media can also provide teachers with a sense of belonging, and participating in community dialogue can bolster confidence or promote attainment of aspirational aspects of one's own perceived professional identity (Robson, 2017). Additionally, social media can expand notions of affinity spaces for situated learning, where social media platforms provide a space dedicated to timely discussions around pedagogical concerns or teaching practices (e.g., Greenhalgh & Koehler, 2017).

Although the majority of teacher learning on social media occurs in informal contexts, a growing number of PD designers are utilizing social media to supplement formal PD (Greenhow et al., 2020). As a PD tool, social media platforms have often been used as supports in conjunction with teachers adopting new technologies in their classrooms (e.g., Wang et al., 2014). By providing opportunities for ongoing discussion of experiences and challenges, social media platforms have shown particular promise in raising teachers' self-efficacy beliefs around technology integration and their technological pedagogical content knowledge (TPACK) (Blonder & Rap, 2017). In other instances of PD, social media has provided a general moral support and resource sharing mechanism throughout the school year (e.g., Goodyear et al., 2014). However, social media integration within PD is often incidental, rather than intentionally designed into the overarching programming, and more research is needed to understand how PD designers should be incorporating social media into their experiences (Greenhow et al., 2020).

Interest development and self-efficacy

As mentioned above, social media is well-suited for providing ongoing support to teachers over an extended timeframe (e.g., Goodyear et al., 2014), while also potentially building teacher confidence and aiding in the cultivation of teaching identity or beliefs (e.g., Robson, 2017). Given these affordances, we argue that interest development (Hidi & Renninger, 2006) and teacher self-efficacy (Blonder et al., 2014) provide two useful lenses for understanding social media's role in teacher learning and professional growth.

Interest, in the context of learning, can be defined as the psychological state during meaningful engagement with content, as well as the likelihood of re-engaging with particular content over time (Renninger et al., 2018). Triggering individual learners' interest can develop their motivation and support sustained engagement with activities related to learning topics (Linnenbrink-Garcia et al., 2012). Hidi and Renninger (2006) posit that learner interest development can be understood as progressing from triggered and maintained situational interest to emerging and well-developed individual interest. During triggered or maintained situational interest, learner engagement may be fleeting or superficial. At these nascent phases of interest development, learners may benefit most from concrete guidance or suggestions, and they may seek recognition for their efforts and contributions (Renninger et al., 2018). As interest develops, learners with emerging or well-developed individual interest are likely to independently re-engage with learning content in meaningful ways (Hidi & Renninger, 2006). At these more developed phases, learners are more likely to challenge themselves, and they may seek constructive feedback as they begin to conceptualize their place in a larger field (Renninger et al., 2018). Simply triggering situational interest does not guarantee that learners will progress to individual interest, but access to interest-appropriate guidance, resources, and supports, can help learners progress to more well-developed phases (Renninger et al., 2018). Effective PD is reliant on long-term engagement and re-engagement with PD content (Darling-Hammond et al., 2017), so supporting teacher interest development (i.e., a teacher's likelihood of independently re-engaging with PD content over time) may be important for ensuring long-term learning and improvement of professional practices. Given social media's natural capacity for long-term and ongoing discussion, feedback, and resource distribution, we believe that social media is a promising tool for supporting teachers' interest development.

Self-efficacy, originally theorized by Bandura (1997), broadly describes a learner's belief in their own abilities to achieve certain levels of performance or complete certain tasks. Conceptualizations of teacher self-efficacy have been applied in a range of teacher learning contexts (e.g., Atasoy & Çakiroğlu, 2018), and positive self-efficacy has been associated with many benefits for teachers, such as improved student learning outcomes, increases in student motivation, and an increased likelihood that the teacher will try new or innovative methods of teaching (Blonder & Rap, 2017). Much like well-developed levels of individual interest, positive self-efficacy may or may not develop organically, and Bandura (1997) argued these beliefs are generated from four possible sources: mastery experiences (i.e., direct experiences of succeeding completing a task), vicarious experiences (i.e., observations of others), verbal persuasion (e.g., a mentor providing encouragement), and physiological and affective states (e.g., unhappiness dampening confidence). Research has found that in the case of teachers, mastery experience (i.e., positive perceptions of one's own past accomplishments) is most effective for cultivating positive self-efficacy beliefs, but external scaffolds, such as positive feedback or encouragement can also help to build positive self-efficacy (Blonder et al., 2014; Renninger, 2010). While interest and self-efficacy are distinct, beliefs about self-efficacy may significantly impact interest and vice versa, and these concepts are often intertwined within an individual's experience (Renninger, 2010). For example, if a person believes that they are skilled at a type of task, they will generally be more likely to re-engage with that task.

As we present in the study below, we believe that the affordances of social media, in this case a WhatsApp group for teachers, can support and cultivate interest development and self-efficacy beliefs among a group of teachers following participation in a formal PD.

Methods

Context and Participants

As part of a larger NSF-funded project, our team implemented two iterations of an asynchronous online PD in the summers of 2019 and 2020 that guided high school science teachers through the steps of enacting a curriculum using computer simulations to demonstrate biological phenomena. This PD was designed to take teachers approximately 40 hours, and throughout its duration teachers were exposed to new content knowledge (e.g., complex systems in Biology), engaged with and learned about a variety of Biology computer simulations, and worked with mentors and peers to plan their own implementation of lessons adapted from lesson plans developed by the PD designers. A guiding principle in the design and implementation of the PD was scaffolding access to social capital among teachers (Yoon et al., 2020). In order to support peer-to-peer learning and a sense of community in the online PD, participants were invited to attend semi-monthly synchronous virtual meetups, guided to discuss and engage with each other in a structured discussion forum, and connected with peer mentors. More detail on the design and implementation of each iteration of this PD can be found in Yoon et al. (2020).

In June 2020, a WhatsApp group was created as an optional extension of the PD for participants to continue engaging with each other beyond the 6-week PD. WhatsApp was chosen because several teachers already routinely used the platform. Between June 2020 and June 2021, 24 participants (out of 96 that completed the course) from eight different countries joined the WhatsApp group, with the majority joining from India (seven participants) and the US (10 participants). One intent of the group was to allow for peer connections across cohorts, so participants from each iteration joined the group. Two members of our team, both authors on this paper, acted as facilitators in the group discussion. Over the 13-month duration of the group, participants made 217 posts while the facilitators made 89 posts. Out of the 24 participants in the group, 15 posted at least once. Several scaffolds were implemented in the WhatsApp group with the aims of (1) promoting teachers' continued interest and engagement with PD resources, content, and ideas as a means to support classroom practices and implementation, and (2) cultivating a welcoming online space to build teacher confidence and to support teachers communicating with and learning from each other. These scaffolds can be found in Table 1.

Table 1

Scaffolds implemented in the WhatsApp group

Scaffold	Description	Example
Disseminating readily usable or easily interpretable resources/media	Resources and media that were related to concepts from the PD were curated and shared with the group. These were selected for their ease of interpretability and for their direct applications in the classroom or in a teacher's professional growth. This was meant to cultivate and support interest development among PD participants to continue engaging with the PD content and curriculum (Renninger et al., 2018).	Facilitator: "I thought this ~10 minute video was super cool and would be quite accessible for a huge range of students. If you are interested, I would definitely recommend checking it out 😊 [link to video]" Participant A: "This is amazing! Thank you :)"
Encouraging the exchange and discussion of implementation experiences	The group was framed (in the group description, emails to participants, and during PD meet-ups) as a space for discussion of implementation experiences, questions, and concerns. This aimed to provide participants with opportunities to explore and receive feedback on their own mastery experiences while exposing peers to vicarious experiences (Blonder et al., 2014) while also encouraging re-engagement with PD concepts or ideas.	Participant B: [shares two short videos of students engaging with a lesson previously discussed in the WhatsApp group] "Thank you for all your guidance [Facilitator]. Very glad to be a part of this group" Participant C: "Amazing.. would love to learn from you [Participant B]!" Participant B: "Thank you. Sure [Participant C]. Anytime. 😊"

Supporting an environment where participants receive explicit public recognition for their efforts and contributions to the group	Explicit public recognition of participants' efforts and contributions was posted by facilitators following participant posts. The aim was to cultivate and support motivation, confidence, and interest development among PD participants to continue engaging with the group and the PD content/curriculum (Renninger et al., 2018). The facilitators activities were meant to serve as a model for other participants to express appreciation as well.	Participant D: "Hello guys, check out this resource if you haven't already: [tool for online teaching during the pandemic]" Participant C: "Thank you for sharing!" Participant E: "Amazing" Facilitator: "Love this!"

To delve more deeply into the experiences of the participants in this group, we focused our analysis on six teachers. These teachers were selected to reflect a range of participation levels, as well as a representative array of geographic locations and school demographics. Three of these teachers, Hina, Carl, and Aaliyah, teach at public high schools in the US. Two other teachers, Aditi and Maryam, are in India, while the last teacher, Abigail, is in Kenya. These three teachers work at private high schools in large cities. Hina and Abigail were the two most active posters in the group. Carl, Aaliyah, and Maryam posted occasionally relative to others. Aditi posted a few times at the formation of the group before transitioning to lurking. Future research will examine the experiences of fully non-posting participants.

Table 2
Information on the six teachers in this study

Name	Posting Activity	Year of PD Completion	Country	School SES Information
Hina	Posted 67 times	2020	USA	55% white; 12% qualifying for free/reduced lunch
Carl	Posted 14 times	2019	USA	10% white; 100% qualifying for free/reduced lunch
Aaliyah	Posted 16 times	2020	USA	42% white; 39% qualifying for free or reduced lunch
Aditi	Posted 4 times	2019	India	Predominantly high-SES local students
Maryam	Posted 24 times	2019	India	Predominantly high-SES local students
Abigail	Posted 58 times	2020	Kenya	Predominantly high-SES local students

Data sources and analysis

Semi-structured interviews were conducted with the six teacher participants. The interviews followed an interview protocol that included 26 questions (e.g., "how would you describe the discussion in the WhatsApp group?" or "were there instances when discussion in the WhatsApp group impacted the way you think about your own teaching?"). The interviewer encouraged participants to share the reasoning underlying their answers. Furthermore, each teacher completed pre- and post-surveys before and after participating in the PD (e.g., "what do you expect from this PD opportunity?" and "what do you anticipate will be the most difficult challenges for implementation?"). An iterative process of qualitative data collection and analysis was adopted to draw meaning from the data sources (Ravitch & Carl, 2020). The interview and survey data and the posts made in the WhatsApp group were qualitatively analyzed by the first author for ideas and comments that elucidate the participants' experiences in the WhatsApp group and how those experiences impacted their learning and professional growth in relation to the original PD. Specifically, a focus was placed on identifying themes that emerged related to interest development and teacher self-efficacy. These themes were presented to the other authors on this paper for corroboration. Disagreements were resolved through discussion until consensus was achieved. In situations where clarification or additional information was needed, follow-up interviews were conducted with the teachers. Over the course of this analysis, three follow-up interviews (with Hina, Aaliyah, and Anita) were conducted.

Results

Personalization of experience to meet interest-appropriate goals and needs

Participants joined the WhatsApp group with varying levels of situational or individual interest, and the overall usage and perceived value of the group varied accordingly from teacher to teacher. For several teachers, access to peer perspectives was critical in either promoting further interest development (Aaliyah and Abigail) or in meeting the interest-specific needs of the teachers (Hina and Aditi). Likewise, the dissemination of readily digestible resources, such as short videos, prompted re-engagement and sustained interest among two participants (Carl and

Hina). These teacher experiences, framed by their differing interest-appropriate goals and needs, are examined more thoroughly below.

One result of the WhatsApp group was the formation of a mentorship pairing. Aaliyah was so impressed by Hina's contributions during peer discussions throughout the PD that she reached out to Hina in the WhatsApp group to see if she could schedule a phone call. As Aaliyah described, "she seemed really resourceful, so I hit her up on WhatsApp, and she was like, 'sure we could do a Zoom meeting.' So we Zoomed each other, and I actually implemented." At the time of this initial engagement, Aaliyah described herself as experiencing maintained situational interest in the PD and its concepts. Aaliyah had not regularly returned to PD materials prior to her interaction with Hina, and her plans for implementation were uncertain. By offering direct guidance for implementation, Hina's mentorship made re-engagement with PD materials manageable. This mentorship continued throughout the school year, and access to expert peer guidance encouraged Aaliyah to regularly return to lesson ideas from the PD and to adapt them to her classroom. Overtime, Aaliyah's interest progressed and transitioned towards emerging and well-developed levels of individual interest. Following participation in the WhatsApp group, she continued to engage with PD ideas independently, and she planned to continue implementing and adapting PD lessons for the foreseeable future. Aaliyah credited the WhatsApp group for this development. She said,

> I think when you're online, some [connections] just don't happen organically, because you're online and everyone doesn't know each other […] Having the [WhatsApp] group, I think that was a natural fostering thing, because it's natural for teachers to share information [and] encourage newer teachers.

Hina, the mentor in this case, also valued these interactions. Aaliyah shared her lesson plan ideas with Hina, and Hina provided feedback. She explained, "it was really, really nice to connect with somebody [and to] hear her side of things." For Hina, these interactions also spurred her to regularly return to PD concepts, and she appreciated this motivation. She already had high levels of individual interest prior to joining the WhatsApp group, but the opportunity to be seen as a mentor and to have her expertise appreciated helped to further cement desire to continue re-engaging with the PD curriculum. In fact, her well-developed individual interest led to occasional frustration with the broader group. She hoped the group would be more active, and she was hoping to receive more challenging and constructive feedback from peers. She felt the discussions in the group did not always adequately challenge her.

In Abigail's case, the group delivered timely guidance on classroom practices followed by encouraging feedback. Abigail reached out to the group for advice on implementing a simulation activity with her students. Similar to Aaliyah, she described herself as experiencing maintained levels of situational interest, and she was uncertain if she would eventually implement lessons from the PD. In particular, she had doubts that computer simulations were worth implementing within her classroom and teaching practices, at one point asking herself during the PD, "is this for me?" However, she thought a suggested lesson idea posted in the group could work well in her classroom, and she tried implementing it. She shared videos of some of her students' work in the group and received several accolades from peers. She found these acknowledgements deeply motivating, and it pushed her to continue considering ways to adapt her teaching and capitalize on simulations like those from the PD. She then regularly and independently returned to the PD simulations and curriculum, and she sought out other opportunities to implement simulation-based lessons in her classroom. In her words, "the ideas which I got from that group are really amazing. [...] My way of teaching has changed a lot." Though she finished the PD with situational interest in the PD ideas, her participation in the WhatsApp group served to support her development of deeper individual interest.

Less directly, participation in the WhatsApp group provided aspirational models of teaching practices. Although Aditi posted just four times, she checked every post that was made in the group. She joined the group with well-developed levels of interest in the PD and its curriculum, and she had already implemented several of its lessons with her students during the previous year. In her case, she did not feel the need for explicit support or encouragement to continue implementing and iterating on the PD curriculum. However, she hoped to continue to improve her pedagogy, and she valued peer interactions on WhatsApp in this regard. She was a member of several professional WhatsApp groups, and she said seeing the diversity of methods and resources that teachers use to engage their students is inspiring for her. She aimed to create an interactive classroom for her students, and seeing her peers' resources and experiences motivated her to work harder to do so. As she described, "when everybody around you is trying new things, making [their classes] more interesting, and presenting ideas in such a way in which children are also responding to it, you are motivated to try different things." In her case, learning from peers is an on-going and long-term process, and continual access to her peers' perspectives fosters her desire to

regularly examine and improve her own methods. This process of examining her own practices in reference to those of peers she respects aligns with her well-developed levels of interest.

Finally, access to easily digestible and concrete resources was highlighted as a benefit of the group. Unlike the other teachers, Carl did not seek out access to peers' perspectives, and peer-to-peer exchanges were much less critical to his overall experience in the group. He joined the group with maintained levels of situational interest in the PD curriculum, though he did not regularly engage independently with the PD content or lessons beyond the PD. He believed the group's value came from the posts that shared easily digestible content, such as short educational videos. He liked the more theoretical aspects of the PD, and he enjoyed returning to those ideas when educational videos were shared in the group. Each of these short posts served as reminders and encouragements to return to PD concepts, and he appreciated these short and accessible nudges. Like Carl, Hina also valued these short video resources, but from a different perspective. Her interest levels were significantly more developed, and the resources posted in the group acted as prompts to interrogate and think deeply about how she can effectively integrate the curriculum into her classroom. As she described, resources that were shared in the group "kept the [PD curriculum] at the forefront of my mind." In one instance, a short video reminded her of her work as a PhD student. Though the video was only tangentially connected to the PD curriculum itself, it triggered Hina to see a new connection between her past research and the PD modules. "I was like, 'Oh my gosh, how come I have never thought about this?' And so, I spent 2-3 days looking at it whenever I had time. [...] It's not necessarily that it converts into an automatic lesson to implement, but it does give me an idea." As she was developing her ideas for a new lesson plan, she shared her plans with the group, and she hoped to implement these ideas in the coming school year.

Scaffolding of mastery and vicarious experiences and access to verbal persuasion

Three teachers, Abigail, Aaliyah, and Maryam, described the group impacting their self-efficacy beliefs. Central to these experiences were the ability to share and receive feedback on personal mastery experiences and the opportunity to witness the vicarious experiences of others in the group. Access to verbal persuasion in the form of encouragement from peers and mentors helped to further solidify beliefs around self-efficacy.

The scaffolding of mastery experience was critical in Abigail's case. Her initial low levels of interest ("is this [PD] for me?") were at least partially derived from negative feelings of self-efficacy. She did not see herself as the type of teacher that could confidently integrate technology into her classroom, and this hesitance dampened her interest and discouraged her from meaningfully engaging with and implementing technology-based lesson ideas. However, the WhatsApp group provided her with a means to receive digestible, real-time guidance from facilitators and peers, and it provided her with an outlet to share her work and receive positive feedback. The overall experience described above, of successfully implementing and sharing that experience with others for feedback, served to dramatically build her confidence. As a result, her beliefs around her own capacities to adapt her teaching and integrate technology have substantially increased. She described this change as altering her teaching style overall and shifting her role in her school, where she began to advocate for more simulation-based teaching methods among her colleagues. "I'm very popular nowadays," she said. "In my campus, teachers come to me and say, 'teach me how to go about [teaching with computer simulations].'" The mastery experience (i.e., successfully implementing a simulation-based lesson) and the positive encouragement from peers when reflecting on that experience, strengthened her perceptions of her own abilities.

For Aaliyah and Maryam, the change in self-efficacy beliefs was less pronounced, but still meaningful. In each case, the teachers felt less confident about the immediate steps they should take to effectively implement PD lessons in their classes. For these teachers, access to peer guidance in the form of vicarious experience and verbal persuasion were valuable. Aaliyah drew from Hina's direct mentorship. She explained, "Hina was my go-to person because she had done it, and she would give advice if I really got stuck. [...] It was very much like, if [I] ran into a speed bump or if [I] had an immediate question, [I] would get the answer from [her]." Aaliyah says she probably would have implemented the PD lessons with or without support from Hina and others, but the guidance built her confidence and made the process less daunting. Drawing from Hina's explanations of her own implementation experiences coupled with Hina's encouragement provided Aaliyah access to the vicarious experience and verbal persuasion she needed to feel more confident.

Maryam drew directly from the posts that Abigail shared in the group. When Abigail shared her students' work in the group, Maryam was impressed. Seeing Abigail's example made the simulation-based lesson feel manageable, and she decided to follow Abigail's example and implement the same lesson with her students. Here, the explicit vicarious experience (i.e., observing the videos of student work posted by Abigail) provided the catalyst. Abigail's posts laid out manageable steps to follow and made her own implementation feel feasible. Maryam's implementation went well in her eyes, and this mastery experience further contributed to her self-efficacy beliefs. She posted her experiences and some of her students' work to the group and also received

accolades from peers, further cementing her positive perceptions of her mastery experience. As with Abigail and Aaliyah, the group provided Maryam tangible opportunities for improving self-efficacy beliefs.

Discussion

This study contributes to the growing body of research on teacher social media usage as a means for ongoing professional learning. Generally, many of the potential benefits of social media previously identified in the literature have also emerged in this case as well. Participating in the WhatsApp group created opportunities for mentorship and peer support to emerge (e.g., Hashim & Carpenter, 2019). This occurred quite explicitly in the case of Aaliyah and Hina and less formally in the instances of participants posting their experiences for feedback and encouraging each other (e.g., Maryam and Abigail). The group also provided opportunities for teachers to access resources and to have ongoing moral support throughout the year (e.g., Goodyear et al., 2014).

As Greenhow et al. (2020) have argued, there remains a need for more research examining social media's optimal role in teacher learning and formal PD, and we believe this study provides one perspective to approach this issue. Although our formal PD occurred during the summer, the WhatsApp group offered an extension for teachers to continue re-engaging with PD content and ideas over time. Teachers entered this group with differing levels of situational and individual interest. and the group provided the teachers with opportunities to personalize their experience in accordance with their differing interest-related goals and needs. Aaliyah and Abigail entered the group with lower levels of situational interest relative to their peers, and they appreciated the concrete guidance from peers and facilitators in the group (e.g., Renninger et al., 2018). In Abigail's case, opportunities to receive positive feedback within the group also seemed to increase her likelihood of re-engagement, which aligns with the interest literature (Hidi & Renninger, 2006). Carl, who also had less-developed levels of situational interest, was most intrigued by simple and easy-to-access content about PD ideas, and this content triggered his re-engagement with PD concepts. Hina and Aditi joined the group with well-developed interest, and their experience in the group reflected this difference. Hina's role as mentor to Aaliyah made her feel genuinely appreciated for her expertise (Renninger et al., 2018), and she appreciated that the varying resources being shared in the group would encourage her to interrogate her existing understanding of PD concepts. Aditi also relied on WhatsApp to better understand her pedagogical practices as they relate to peers' practices (Renninger et al., 2018), particularly around interactive forms of teaching.

The role of social media in promoting teacher self-efficacy, especially around the use of technology, has been previously documented (Blonder & Rap, 2017; Wang et al., 2014). However, the use of WhatsApp as a direct extension of PD to support self-efficacy regarding PD lessons and resources appears to be a promising outcome of this study. Abigail, Aaliyah, and Maryam each experienced strengthened self-efficacy resulting from participation in the group, with Abigail experiencing a profound increase in her confidence. Mastery experience, vicarious experience, and verbal persuasion each contributed to these increases in self-efficacy. Mastery experience has been highlighted as the most valuable aspect of self-efficacy development for teachers (Blonder et al., 2014), and participation in the group contributed toward Abigail and Maryam both undergoing their own mastery experiences of implementing simulation-based lessons in their classrooms. As teachers' experiences were shared with each other, for example in the form of videos captured in class, they also served as mechanisms for teachers to access vicarious experiences for better understanding implementation. Verbal persuasion, in the form of mentorship (Aaliyah and Hina) and positive feedback and encouragement (Maryam and Abigail), was present as well.

Importantly, the participants in this study represent only a fraction of those that participated in the WhatsApp group overall, and the WhatsApp group itself represented just a fraction of those that participated in the original PD course (24 of the 96 PD participants joined the group). It is likely that the effect of the group on many other members (such as those that entirely lurked without posting) was less impactful, perhaps substantially so, and future studies will examine a broader range of participant experiences. However, given the ultra-low-cost nature of a WhatsApp group and the minimal time investment required to create and facilitate such a group, the substantial impact it had on these six participants is meaningful. While WhatsApp and social media may not have served as a universal support that benefited all teachers in the PD, the impact that it did have on this subset of PD participants is promising. Looking ahead, the utilization of WhatsApp and social media as a support mechanism for long-term interest and self-efficacy development within and beyond PD offers an encouraging opportunity for PD design and research.

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