



Victoria A. Goodyear, Melissa Parker & Ashley Casey (2019) Social media and teacher professional learning communities, *Physical Education and Sport Pedagogy*, 24:5, 421-433,

<http://dx.doi.org.10.1080/17408989.2019.1617263>

1 **Social media and teacher professional learning communities**

2 Victoria A. Goodyear^{a*}, Melissa Parker^b and Ashley Casey^c

3 ^aSchool of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, UK.

4 ^bDepartment of Physical Education and Sport Sciences, University of Limerick, IRE

5 ^cSchool of Sport, Exercise and Health Sciences, Loughborough University, UK

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26 Abstract

27 *Background:* An extensive and international evidence base positions professional learning
28 communities (PLCs) as an effective continued professional development (CPD) mechanism
29 that can impact on teachers' practices and, in turn, students' learning. The landscape of
30 teacher PLCs is continuously developing; notably through teachers' uses of social media.
31 Yet, there is limited robust evidence identifying the characteristics of social media PLCs that
32 impact on teachers' learning and practice.

33

34 *Purpose:* This exploratory study examined the characteristics of a specific Twitter-based
35 professional learning community - #pechat. The research questions were: (i) what is the
36 nature of a Twitter-based professional learning community? and (ii) what characteristics of a
37 Twitter-based professional learning community develop learning and practice?

38

39 *Methods:* Data were generated from 901 tweets between 100 participants; and 18 in-depth
40 semi-structured elicitation interviews with participants and moderators of the Twitter-based
41 professional learning community. Data were analysed through a process of deliberation, and
42 a relativist approach informed quality.

43

44 *Findings:* Two themes are reported to explain the nature of the Twitter-based professional
45 learning community and the different types of characteristics of #pechat that developed
46 learning and practice. The first theme *engagement* shows how different participants of
47 #pechat engaged with discussions and how moderators played a key role in facilitating
48 discussions between participants. The second theme *shared practices* shows how discussions
49 between participants of #pechat led to the development of new practices that some teachers
50 were able to use to accomplish particular objectives in their physical education lessons.

51

52 *Conclusion:* The analysis of the data provided evidence to suggest that #pechat is a PLC and
53 is representative of an established group of practitioners. These characteristics should be
54 considered in the design of future online professional development experiences. Facilitator or
55 moderator training could support the development of social media based PLCs that
56 subsequently and positively impact on teachers' practices.

57

58 *Keywords:* *communities of practice; professional learning; constructivism; situated learning*

59

60

61

62

63

64

65

66 It is extensively agreed that teacher professional development (PD) is an essential mechanism
67 through which to enhance the quality of teaching and, in turn, improve students' learning
68 outcomes (Armour et al. 2017; Sato and Haegele 2017). Yet, for a number of decades it has
69 been reported from diverse international and socio-economic contexts that physical education
70 teachers are rarely able to access and engage with effective PD, with time, cost, and a lack of
71 access to relevant content frequently cited as key barriers (Parker and Patton 2017,
72 Makopoulou 2017). As a result, there are concerns about teaching quality and whether
73 classroom practices are evidence-based (Armour et al. 2017, Sato and Haegele 2017). The
74 enduring issue of effective teacher PD is coupled with the ongoing marginalisation of the
75 subject (Pope, 2011, masked for peer review). For example, cuts to the time devoted to the
76 development of subject knowledge in graduate physical education teacher education
77 programs are becoming commonplace (Dudley and Burden 2019), alongside the reduction of
78 physical education teacher education programmes in leading international institutions^{1, 2}.
79 This means that, across physical education teachers' careers, opportunities to learn and
80 develop their practices are becoming increasingly limited. The creation of new PD practices
81 that support teachers' learning needs, and navigate contextual barriers to PD, are therefore
82 vital for teachers and for those researching physical education.

83 Social media has been reported as an increasingly 'popular' digital/online context
84 used by teachers for PD purposes (see Greenhow et al. 2018, Greenhow and Lewin 2016).
85 There is evidence that teachers use a range of different social media sites - such as Twitter,
86 Facebook and YouTube - to post and exchange pictures, resources and information
87 (Greenhow et al. 2018, Harvey and Hyndman 2018). Furthermore, teachers are reported to be
88 forming communities on social media, and engaging in social-media based chats to share

¹ <https://www.thelantern.com/2018/02/physical-education-teacher-education-program-to-be-phased-out-by-2022/>;

² [MASKED FOR PEER REVIEW]

89 information about their practices (Krukta and Carpenter 2016, Trust et al. 2016, Wesley
90 2013). Yet, there is limited robust evidence on the types of content, interactions and spaces
91 that support teachers' learning and practices (Britt and Paulus 2016, Carpenter and Krukta
92 2016, Krukta and Carpenter 2016). Despite almost a decade of research on social media and
93 teacher PD (Greenhow et al. 2018), the primary empirical focus has been on why teachers
94 engage with social media for PD (Britt and Paulus 2016, Carpenter and Krutka 2015, 2014,
95 Harvey and Hyndman 2018). There is very limited understanding about how *teacher learning*
96 occurs via social media and how social media operates as a form of PD that impacts on
97 practice.

98 The purpose of this paper is to examine social media as a contemporary form of
99 teacher PD. The specific focus is on better understanding how teachers' engagement with
100 social media develops their learning and practice(s). The article reports on a case study of a
101 Twitter-based physical education chat - #pechat - and presents new data from over 100
102 international participants. The concept of professional learning communities (PLCs) is
103 applied to explain the social media-based learning context(s). The research questions were:
104 (i) what is the nature of a Twitter-based professional learning community and (ii) what
105 characteristics inherent within that professional learning community develop learning and
106 practice?

107

108 **Professional Learning Communities**

109 An extensive evidence-base reports on how the concept of PLCs can be applied to assist in
110 explaining the architecture of learning environments in group or community-based contexts
111 (Parker et al. 2012, MacPhail et al. 2014). PLCs are generally referred to as groups involving
112 members who share common learning/professional interests, in which interactions and
113 discourse take place over time through discussion, analysis and problem solving, that result in

114 professional learning (MacPhail et al. 2014, Parker et al. 2012). The conceptual framework of
115 PLCs was, therefore, highly relevant the social media-based context of a bi-monthly Twitter
116 chat, and was applied as an analytical framework for this study.

117 An international literature base has sought to define and establish different types of
118 characteristics of PLCs (see Author 2015, Armour et al. 2017, Parker and Patton 2017, Yoon
119 & Armour 2017). Parker et al. (2012) identified three broad types of PLCs: (i) collections of
120 authentic teachers, (ii) established groups, and (iii) communities of practice (CoP) (see Table
121 1). These different types of PLCs are defined by five characteristics with differing features:
122 (i) success; (ii) guideposts; (iii) facilitator; (iv) roadblocks; and (v) potential (see Table 1).
123 The main differences between these five characteristics is the collaborative and co-
124 constructed nature of how individuals work together in groups. For example, whereas in the
125 collection of authentic teachers' success is determined at an individual level, in a community
126 of practice (CoP) success is integrated amongst the practices of group members (Table 1).
127 Parker et al. (2012), and later MacPhail et al. (2014), argued that the more groups adhered to
128 the constructs of CoPs deeper learning, more focussed the direction of learning, and stronger
129 growth in teachers and the community would be evident. The characteristics of CoPs can
130 therefore be used as aspirational criteria for the design of effective professional development
131 (MacPhail et al., 2014; Parker et al., 2012). In that context, we explain CoPs in a bit more
132 detail.

133 CoPs are grounded within situated learning perspectives (Parker et al., 2010). A CoP
134 can be summarized as 'groups of people who share a concern or a passion for something they
135 do and learn how to do it better as they interact regularly' (Wenger and Wenger-Traynor
136 2015, 1). CoPs are not haphazard groups (Lave and Wenger 1991). Groups evolve as
137 members come and go and as old members leave and new ones join. Lave and Wenger's
138 (1991) notion of legitimate peripheral participation can be used to describe how newcomers

139 become fully participating community members. When members are new, learning is not so
140 much seen as knowledge acquisition as it is more of a process of social engagement as
141 learners ‘move toward full participation in the socio-cultural practices of a community’
142 (Smith 2009, no page). During legitimate peripheral participation, newcomers begin their
143 participation by engaging in activities that may appear simple, yet, are necessary for the
144 group. Through these peripheral activities, novices become acquainted with the tasks,
145 vocabulary, and organising principles of the community. In this phase there ‘is a concern
146 with identity, with learning to speak, act, and improvise in ways that make sense in the
147 community’ (Smith 2009, no page). In essence, ‘learning to talk the language of the
148 community’ is foundational to legitimate peripheral participation (Lave and Wenger 1991)
149 and is representative of the process of newcomers.

150

151 **Methods**

152 A case study design was adopted to provide rich and in-depth insights into teachers’
153 engagement the Twitter-based chat, #pechat (Hodge and Sharpe 2016). An iterative design
154 was adopted to provide both breadth and depth in the data generation process.

155 *Site and Context*

156 The site of this study is Twitter and the context of Twitter that we explore is the
157 #pechat group. Twitter is a free micro-blogging site where members can post messages in the
158 form of tweets. At the time of the study, tweets were restricted to 140 characters but these
159 could include text, pictures and/or links to other websites. Various other functions are
160 available that enable Twitter users to share or view information with specific people and view
161 or engage with discussions with groups of Twitter members (Table 2). Hashtags can be
162 embedded within tweets and are used to signify a specific topic, a group of people, or to
163 tweet within a Twitter chat group. Twitter members can create their own hashtags or search

164 for specific hashtags commonly used. When Twitter members search or use common
165 hashtags they can view other tweets about the specific topic (for example, #physed), they can
166 engage with a specific group of people (for example, #pegeeks), or they can engage with a
167 Twitter-based chat (for example, #pechat). Importantly, a Twitter user does not have to tweet
168 to view the posts that are made using the hashtag.

169 [Insert Table 2 here]

170 #pechat is a Twitter based chat forum that uses the same hashtag for Twitter users to
171 engage in discussions. #pechat was founded in 2011 by a physical education teacher who was
172 also the founder of a professional development website (www.thephysicaleducator.com) that
173 is linked to and used to promote #pechat. At the time of the study #pechat (which had been
174 running for approximately three years) was hosted bi-monthly and occurred at 7pm across
175 five international time zones (Australian Eastern Time, Singapore Time, Greenwich Mean
176 Time, Eastern Standard Time, Pacific Standard Time) on a Monday evening. Each #pechat
177 was based around a specific topic with pre-defined questions for contributors to answer. The
178 topics and questions were usually selected by the founder of #pechat and were generated
179 through polls hosted on the website and shared through Twitter.

180 For each of the five #pechat's a moderator was assigned; one for each of the time
181 zones. The moderator's role was to tweet the pre-defined questions and to guide the
182 discussions by asking questions and prompting users to share their perspectives.

183 ***Data Generation***

184 Data were generated from two sources: Twitter and interviews. The contextual focus
185 was on five different international #pechats that took place on the same day in March 2014.
186 The broad topic of the #pechat was 'a cry for help' and was focussed on how practitioners
187 could help other teachers to develop and change their practices. The moderators were
188 provided with a series of questions to guide discussions.

189 First, similar to the approach adopted by Author (2017), data were generated from
190 tweets made during the five chats using the application Twitonomy³. The aim of generating
191 data from Twitter was to provide an illustrative example of the types of interactions within
192 the Twitter chat. The hashtag #pechat was used to search for and gather tweets. Data from
193 Twitonomy were exported to an Excel file and the participants and the content of each
194 participant's tweets were identified. Across the five #pechat's a total of 901 tweets were
195 made by 100 different people. The tweets generated informed the selection of participants for
196 interviews and the content of interview questions, and the tweets were later combined with
197 the interview data during analysis. The tweets therefore provided an additional layer of rigor
198 in this study. Methodologically, the tweets directed and maximised the focus on the
199 relationship between social media and teacher learning. Empirically, the tweets strengthened
200 the robustness of the findings, where evidence is reported from real time (tweets) and
201 retrospective data (interviews) (Author 2017).

202 Secondly, data were also generated from 18 individual interviews, that took place
203 following the #pechat. The aim of generating data from interviews was to interpret how the
204 participants engaged with the #pechat, and how they had engaged with #pechat over time (i.e.
205 beyond the specific chat in March 2014). A purposeful sampling approach was adopted using
206 a criterion-based technique (Sparkes and Smith 2014). This approach was selected to ensure
207 that the participants of this study were representative of range of #pechat participants, but that
208 had all participated in #pechat over a period of time. The criteria used was based on different
209 intensities of engagement, in terms of participants' role in #pechat and the number of tweets
210 participants made. Following this approach, a sample of 18 was considered to provide a level
211 of rigor (Sparkes and Smith 2014). The sample selected included; (a) moderators (n=4) and
212 (b) participants (n=14) who engaged with the #pechat at high (50 or more tweets), moderate-

³ www.twitonomy.com/

213 high (20 or more tweets) and low (less than 10 tweets) levels. The criterion sampling
214 approach also sought to ensure an appropriate balance in gender and geographical location
215 (see Table 3).

216 The interview process was initially informed by an elicitation approach to provide
217 depth in the participant responses through the use of text-based data to trigger responses and
218 memories (Phenoix and Rich 2016). Participants were asked to read the tweets they made
219 during the #pechat and then discuss their interpretations of these. Following this, questions
220 were asked in a semi-structured format about how #pechat had supported their engagement
221 and learning. Each interview was conducted via Skype and lasted between 45-60 minutes.

222 [Insert Table 3 here]

223 *Ethics*

224 Ethical approval was provided by the Institutional Review Board and Twitter's terms
225 of service were consulted prior to data generation. Passive consent was sought from
226 participants to access tweets made during the #pechats. Passive consent occurred via an
227 information statement posted by the moderators and the first and third author prior to, during,
228 and at the end of each #pechat. The statement was also posted to one of the author's website.
229 The information statement informed participants that tweets made during the #pechat could
230 be used for research and participants' names and specific tweets could be used in the
231 reporting of the findings. Given the public nature of Twitter, the traceability of tweets and,
232 subsequently, the limited effectiveness of de-identification processes in social media research
233 (see Author 2017), anonymization strategies were not employed in the writing of this paper.
234 The information sheet, however, did state that participants had the right to contact the
235 research team via Twitter or email if they did not want their name or tweets to be used in the
236 reporting of the findings. None of the participants of #pechat contacted the research team and
237 in the reporting of the data from Twitter participants first names are used to represent their

238 Twitter handle (e.g., @Adam) and tweets presented verbatim. Active consent and anonymity
239 procedures were followed for data generated from interviews. Participants provided written
240 informed consent and participants were de-identified from the interview transcripts, due to
241 the sensitivity and confidentiality of some of the information they shared.

242 *Data Analysis*

243 The characteristics of PLC's identified by MacPhail et al. (2014) and Parker et al.
244 (2012) (see Table 3) were used to analyse the data. Following this framework, the authors
245 were guided by concepts of success, guideposts, facilitator, roadblocks and potential, where
246 analytical questions derived from the framework were deliberated, decided upon and used by
247 the authors. This process ensured that the research questions remained a central focus while
248 also remaining open and reasonable to emerging understandings. The analytical questions
249 constructed and utilised were: (i) what is the nature of success, guideposts, facilitator,
250 roadblocks and potential in #pechat; and (ii) how does success, guideposts, facilitator,
251 roadblocks and potential support and develop learning and practice?

252 The first analytical step involved the organisation of the Twitter data. In order to
253 interpret ongoing discussions between participants and groups of participants, tweets and
254 conversations were grouped by; (i) separate #pechat's, (ii) singular tweets, and (iii)
255 conversations, that involved a series of two or more tweets. The second step of analysis was
256 informed by the analytical questions. A deliberative strategy was used, inspired by Tracey's
257 (2010) end goals for excellent qualitative research, as well as the work of Englund (2006) and
258 Author (2017). The analytical questions were used by the researchers to independently
259 analyse the data. Each researcher formulated codes and themes, and these became the basis
260 for deliberation between all three authors. The aim was to ensure that themes represented
261 something 'in common' (Author 2017, p. X) about the answers to the analytical questions.
262 The deliberative process resulted in two themes: (i) engagement and (ii) moderation.

263

264 **Validity**

265 A relativist approach was applied to inform validity and determine quality (Burke 2016). A
266 relativist approach extends the robustness of traditional measures of quality drawn from
267 criteriological approaches (Burke 2016), such as trustworthiness, as it offers a framework for
268 determining quality in a way that aligns with the contextual circumstances of the study. In
269 applying a relativist approach and, following the work of Smith and McGannon (2017),
270 universal criteria for judging the quality of research are not applied (e.g. dependability,
271 confirmability). Instead, criteria are selected from an ongoing list of characterising traits that
272 relate to the context of the research (Smith and McGannonn 2017). The following criteria
273 were selected as representations of quality and validity within this research: the worthiness of
274 the topic; the significant contribution of the work; width, that is, the comprehensiveness of
275 evidence and the use of multiple and numerous data sources from a wide sample of
276 participants (n=100); and credibility through the first and third authors' familiarity with the
277 #pechat group, as well as the rigorous analytical process involving deliberation. As part of a
278 list of characterising traits for enhancing the quality of this work, this study also aimed for
279 coherence. In other words, how well the study hung together in terms of purpose, methods
280 and results, as well as its strong underpinning of theory, i.e. PLCs through CoPs. Evidence of
281 quality and validity in this study are therefore aligned with the contextual circumstances of
282 the research.

283

284 **Results**

285 Two themes represent the nature of the Twitter-based professional learning community and
286 the different types of characteristics of #pechat that developed learning and practice: (i)
287 *engagement* and (ii) *shared practices*.

288

289 **Engagement**

290 Two overarching and contrasting forms of engagement were identified: *active* and
 291 *observational*. *Active* engagement was associated with participants of #pechat who held an
 292 identity as a “big name on Twitter” (participant 1 interview). *Observational* engagement was
 293 associated with participants who were referred to as lurkers.

294 The “big names on Twitter” were those who were identified as being “active in social
 295 media” (participant 1 interview) and were often the high or mid tweeters and/or the
 296 moderators (Table 2). The big names shared firm and dominant views and were individuals
 297 who other participants attempted to connect with through replies, retweets (RTs) or favourites
 298 (see Table 1). For example:

299 Adam: Activities and learning opportunities are differentiated for readiness
 300 level. Students can choose within that framework #pechat

301 Naomi: RT

302 Andy: @Adam Amen! #pechat

303 Naomi: @Adam Agree!... That was well said! #pechat (tweets)

304

305 High levels of connectivity with the big names was associated with these participants
 306 having “something worthwhile to say” (participant 2 interview). The high levels of
 307 interactivity were also associated with the number of tweets sent by the big names. Most of
 308 the big names tweeted in more than one of the five #pechat’s. For example, Andy, who made
 309 a total of 65 tweets during the five #pechat’s, tweeted his opinion on a particular topic more
 310 than once. For example, he re-shared his views from the Singapore chat in the Canada chat,:
 311 ‘as I said in last night’s chat, she’s taking responsibility which is great I think. Not so much
 312 blaming herself #pechat’ (tweet).

313 Despite the “big names” connectivity being associated with a valued voice and
 314 opinion, it was acknowledged that others connected with them because they “think that it is
 315 the right thing to do” (moderator 1 interview). The big names held a certain identity within
 316 the #pechat community and were described as “those types of people that will say something
 317 and people will buy into it right away” (participant 3 interview). This identity, however, was

318 not only attributed to the number of tweets, knowledge, or confidence. The big names were
319 described as being white males that was perceived to provide them with a certain privilege
320 for their voice to be heard: “It’s a certain gender, it’s a certain ethnicity, so it’s an interesting
321 question because some voices are heard based on our privilege and based on who we are”
322 (participant 4 interview). The data indicate that the nature of the learning was shaped by
323 positions of power and influence.

324 At the other end of the engagement spectrum were participants identified as “lurkers”
325 (participant 5 interview). Lurking involved observing tweets and commenting only when
326 something was interesting or engaging.

327 I’m basically a lurker.... So I look at everyone’s ideas, like whenever I have
328 downtime I’m on Twitter I’m scrolling through the hashtags seeing what people are
329 saying and then if I see something that’s like really really cool or really inspiring I’ll
330 comment on it. (participant 6 interview)

331
332 The reason for lurking was often associated with participants feeling like they did not
333 have something worthy to contribute. For example, “I don’t feel like I have much to add to or
334 I’ll listen but I won’t add to things so I’ll just lurk a little bit!” (participant 5 interview).
335 Lurkers averaged between one and three tweets (Table 2) and rather than sharing opinions,
336 their tweets often involved asking questions: “how do I give choice to some while still
337 maintaining structure for others in the same class #pechat” (Joe, tweet).

338 Despite a number of participants suggesting that they or others lurked, lurking wasn’t
339 seen as a problem. For example, one lurker was quite open to the #pechat group that he/she
340 had lurked and tweeted, “enjoyed lurking and following along - good discussion all”
341 (coachdeneef, tweet). For the more active users of Twitter, lurking was an accepted form of
342 engagement because it was positioned as a way of helping Twitter members to learn about
343 Twitter, what to tweet, and with whom to interact. In other words, it was a form of
344 apprenticeship or work-place learning. Lurking was seen as a process that would enable
345 people to develop their own professional learning network:

346 You get on, you lurk, you have to find people, you have to find groups to follow
 347 topics to follow and you lurk and you read and you know ... then all of a sudden you
 348 like something. You favourite something, you retweet something and then comes your
 349 big ... you know either a reply to somebody else cos I think that's what I did first, I
 350 post somebody ... sent ... reply...that's an awesome idea so that was the first thing I
 351 wrote. And then from there it was kind of like, ok so I'm gonna put something out
 352 there, you kind of put your feelers out there and your PLN [Professional Learning
 353 Network] grows. (participant 7 interview)

354 The mid tweeters' engagement in #pechat contributed to the momentum of
 355 discussion. These participants' engagement might best be described as sharers. The mid
 356 tweeters would often respond to a moderator's question by sharing their opinions or by
 357 providing examples from their own practices. The mid-tweeters would ask questions and
 358 interact with others during #pechat to understand how they could do particular practices
 359 others had shared. Nicholas asked Adam and Andy (both high tweeters) to explain how he
 360 could use the ideas they had shared in lessons; '@Andy @Adam I only see my 4-6gr. [grade]
 361 classes 30 times in #physed during the year...how do I learn what motivates my S's
 362 [students] #pechat' (Nicholas, tweet).

364 Regardless of the form of engagement it seemed that moderators played a key role in
 365 facilitating the different types of participants' engagement. Moderators described their role as
 366 being about "trying to get people involved... guiding discussions" (moderator 2 interview).
 367 For some moderators this meant ensuring that all participants knew how to engage in
 368 #pechat. The moderators would do this by RTing the pre-determined questions for the
 369 #pechat or RTing the @physical.educator.com's tweet on how to engage with #pechat: "RT
 370 @phys_educator: Not sure how #pechat works? Want to join in the discussion? Check out
 371 our #pechat 101 video here: [link to website removed]" (tweet). During the chats the
 372 moderators posed the topic questions but they also aimed to respond to and develop the
 373 discussions. One moderator spoke of how she aimed to "try to put myself in their shoes to
 374 continue to explain...I try to make them feel emotionally safe" (moderator 3 interview). This

375 moderator acknowledged that there were different types of practitioners involved in the
 376 discussions who had different experiences and levels of knowledge.

377 Sometimes people ask a question and I feel like doh you don't have that foundational
 378 piece, but those are the people I want to support and encourage the most. I am not
 379 sure that everybody feels that way. Tone can sometimes get lost, I am the person that
 380 would rather take five tweets to make sure my tone is clear as opposed to the someone
 381 who might take one and not worry about that (moderator 3 interview)

382
 383 The moderator's role was also seen as being about creating discussions (i.e. a series of
 384 tweets) and encouraging participants to move beyond solitary statements (i.e. one tweet). As
 385 one moderator commented, he needed to question participants as a means for them to
 386 describe and discuss their practices in further detail:

387 Often people will respond with a pretty closed response. I guess the role of the
 388 moderator is to question that again and say ok well why, how or when would you do
 389 this rather than just accepting that, otherwise you end up with, well its not really a
 390 conversation its just a series of statements (moderator 1 interview).

391
 392 In summary, two predominant forms of engagement and types of practitioners existed
 393 within #pechat; active engagement (big names) and observational engagement (lurkers). The
 394 mid tweeters, known as 'sharers', supported the momentum of discussion and the moderators
 395 played a key role in encouraging practitioners to share practices.

396 **Shared Practices**

397 Shared practices refers to how participants generated new understandings, new ideas,
 398 and new practices that could be transferred into their lessons. While #pechat was described as
 399 a form of PD, #pechat discussions did not support all participants learning or practices.

400 Most of the discussions in #pechat involved sharing practices around the pre-defined
 401 topic. Many of the tweets were focused on offering different ways of doing similar things.
 402 These types of tweets were described as being useful to practitioners as they could gain
 403 different ideas that they could transfer into lessons.

404 Naomi: we use e-portfolios in our school & have video and pics #pechat
 405 Tish: videos, blogs, go to school board, NP anything to highlight #pechat

406 Jennifer: I use @socrative to get info. Kids use phones. Took abt 15 min and
 407 gave me great data to use #pechat (tweets)

408
 409 I have an idea or an opinion and so often somebody adds extra value to that or brings
 410 that different perspective that I hadn't thought of, you know, for context and it's
 411 like... fantastic I'm gonna try that. (participant 8 interview)

412
 413 Participants did not always agree on all practices. The moderator was positioned as
 414 someone who would "make the boat rock a bit" (participant 9 interview) and encourage
 415 participants to question their own or each other's beliefs and/or practices.

416 He was playing devil's advocate sometimes, to expand your thinking and kind of take
 417 the opposite side, whether they agree with it or not. (participant 9 interview)

418
 419 The following series of tweets provides an example of how the moderator would
 420 "play devil's advocate" (participant 9 interview). The tweet discussion begins with a
 421 participant sharing the idea of students developing their own games (tweet 1). The moderator
 422 challenged the participants by asking them to explain the learning environment (tweet 3) and
 423 by then suggesting that students developing games is a messy process (tweet 5). Tweet 7
 424 invited other participants into the discussion but the moderator continued to challenge the
 425 participants by raising issues of Moderate to Vigorous Physical Activity (MVPA) (tweet 6).
 426 As the discussion continued (tweets 8 - 13), the participants expanded on the original point
 427 about students developing games and began to discuss how lessons could be structured to
 428 accommodate MVPA. The tweet discussion continued beyond the 13th tweet used as in the
 429 illustration below, but as the 13th tweet indicates, after the moderator had "rocked the boat"
 430 (tweet 5 and tweet 6) the moderator began to agree with the suggestions for practice made by
 431 the participants.

432 Tweet 1: (Matt): @Moderator @Nicholas hand the group a bag of equipment.
 433 Let them develop the game. Also, use 7 parts of the game as
 434 guide #pechat

435 Tweet 2: (Nicholas): limited opportunities for creativity within their educational
 436 experience. Expecting more rules/guidelines from me #pechat

437 Tweet 3: (Moderator): @Nicolas so how can you create a culture of learning that
 438 embraces the opposite

439 Tweet 4: (Matt): kids set own goals. They are becoming self-motivated to learn
 440 and move #pechat
 441 Tweet 5: (Moderator): @Nicholas @Matt I do have personal bias against this idea.
 442 Same with peer teaching. Always messy #pechat
 443 Tweet 6: (Moderator): @Nicholas @ Matt and always loses tons of MVPA....
 444 Tweet 7: (Andy): @Nicolas @Matt @Moderator LEARNING IS MESSY
 445 YAHOOO!! #pechat
 446 Tweet 8: (Moderator): @Nicholas @Matt @Andy hah! I am absolutely ok with
 447 messiness – IF there is a purpose behind it #pechat
 448 Tweet 9: (Andy): @Nicholas @Matt @Moderator it also doesn't have to loose
 449 MVPA when done well
 450 Tweet 10: (Nicholas) @Matt @Moderator @Andy Students HR's during class today
 451 over 150. Their games = more passion! Creating thinkers, not
 452 just doers! #pechat
 453 Tweet 11: (Andy) @Matt @Moderator @Nicholas so you give them a goal to get
 454 HR 150+ for majority of the time, get them monitoring it
 455 #pechat
 456 Tweet 12: (Matt) @Moderator @Nicolas @Andy set up a goal/focus that toward
 457 MVPA. This is an item the teacher can help students develop
 458 #pechat
 459 Tweet 13: (Moderator):@Andy @nicholas @Matt I suppose anything will work if
 460 done correctly. I am a HUGE believer in peer feedback #pechat
 461 (Twitter conversation)
 462

463 The ability to engage in a series of tweets where participants offered different
 464 perspectives had not always been part of #pechat. The participants described how there had
 465 been a shift from resource sharing toward interactions and the development of shared
 466 practices; “it started off being all about resources but now it’s more about concepts or idea
 467 sharing. It’s definitely evolved for me” (participant 10 interview). Importantly, there was a
 468 distinct difference between learning through using Twitter and engaging with #pechat. The
 469 latter made learning associated with collaboration and discussions possible.

470 Social media is not professional development. Social media is a platform.
 471 Professional development for me is the interactions I have with people. The
 472 conversations that I have with people. And the collaboration that it kind of leads to.
 473 So PE-Chats – I think if you are engaging in a PE-Chat and you’re having
 474 conversation – even if you’re lurking you’re definitely learning something. You’re
 475 seeing different perspectives for different people. So yes. So I’d say that it’s a form of
 476 professional learning. (participant 11 interview)
 477

478 Despite somewhat widespread agreement that #pechat was a form of PD, the growth
 479 and popularity of #pechat from its initial introduction had caused some participants to

480 consider that their learning wasn't always supported. As one participant suggested, "a lot of
481 us who started on it [#pechat] feel that it's too big at this point" (participant 10 interview).

482 Moreover, #pechat was described as being "much more congested" (participant 12
483 interview):

484 By the time you've seen something you'd like to engage with 50 other people have
485 jumped in and taken that part of the conversation away so it's just about impossible to
486 actually keep up (participant 12 interview)

487
488 Some individuals were accessing other social media sites and/or developing smaller
489 groups on Twitter. There were other connections forming that were described as "close-knit
490 groups" where participants considered people in these groups as "not just colleagues but
491 friends" (participant 13 interview). The following highlights one participant's engagement
492 with the social media site Voxer and how the community on Voxer enabled her to change and
493 develop her lesson within the same day.

494 I got on Voxer and you know, in between classes I'd have five minutes, I got on and
495 said hey, don't know if any of you played this it's a great warm up game bla bla bla
496 so I wasn't even asking for any help... but...in two to three minutes I had two or three
497 other people who got on and who replied with hey I do that but I do a variation like
498 this... And the very next class I switched and I added that. So I have five minutes
499 between classes and within that time period I learned a new variation that
500 incorporated adding math to my lesson and then a grade in other content areas and I
501 mean the kids loved it just the same. (participant 14 interview)
502

503 Overall participants of #pechat developed shared practices through their responses to
504 particular questions and/or through the moderator challenging the participants' discussions.
505 Although #pechat was valued as a form of PD, many participants engaged with other social
506 media sites to collaborate with smaller groups of members from #pechat.

507 **Discussion**

508 This exploratory study into a Twitter-based PLC has demonstrated that social media
509 can operate as a form of PD for teachers that develops their learning and practices. There was
510 evidence that observing and/or actively participating in Twitter-based discussions supported
511 teachers to develop new understandings and shared practices. In some cases, practices that

512 were co-constructed between teachers during Twitter-based discussions transferred into a
513 teacher's lessons demonstrating that social media has the potential to be a very powerful form
514 of contemporary PD that impacts on practice. Yet, the Twitter-based professional learning
515 community did not influence all participants learning and practices. The participants had
516 different learning needs, contexts, knowledge and practices, and they engaged in #pechat in
517 different ways (active, moderate engagement and passive) and to different intensities (high,
518 mid, low tweets). The differences between the participants resulted in variance in how
519 learning was facilitated and structured within #pechat. The challenge for the field of PD is
520 understanding how to support and develop teacher learning in digital spaces when there are
521 mass numbers of participants with different needs and different intensities of engagement.

522 Identifying the characteristics of the Twitter-based PLC provides a way to determine
523 how learning can be structured and supported on social media. The original contribution of
524 this study is the empirically rich data that identifies the nature of PLC characteristics (i.e.
525 success, guideposts, facilitator, roadblocks and potential – see Table 3), and evidence of how
526 the characteristics that impacted on learning and practice. This study shows that #pechat is an
527 established group. It was evident that there was an accomplished objective of achieving
528 shared practices where individuals, to varying intensities, were empowered to engage with
529 discussions. Furthermore, the data demonstrated that there was continuous interaction
530 between participants, where moderators and mid-level tweeters supported the flow of
531 discussion. The moderators also acted as the role of facilitators, where individuals with
532 higher status on Twitter were also influential. Finally, and in smaller interactional groups,
533 issues were identified and resolved between participants. In this sense, social media was a
534 space that supports professional development in a way that impacts on learning and practice
535 by enabling practitioners to form established groups.

536 Although the Twitter chat acted as a form of PD, the data demonstrate a number of
537 challenges for practitioners using social media as a PD tool. It should be noted that
538 engagement with Twitter chats does not support all practitioners' learning and practices.
539 Clear challenges were evident with regard to the mass, open and many-to-many forms of
540 communication, where interactions became disconnected and fragmented due to high
541 numbers of participants. To navigate against this issues, social media sites that enable smaller
542 groups of participants to come together in more refined spaces are an option. The data from
543 this study suggests that in such spaces, participants can develop richer professional relations
544 and deeper discussions about practice occur. Due to these capabilities of smaller groups, it
545 can be suggested that these spaces of social media may be more representative of legitimate
546 peripheral participation and the constructs of CoPs. To further develop understandings of the
547 social media as a PD tool, future research should examine the characteristics of these smaller
548 and refined PLCs on social media.

549 Another challenge was related to influence and self-presentation. The data suggested
550 that individuals with high status can hijack discussions and direct conversations to issues that
551 they deem important, but may not be representative of the whole community. Issues of
552 gender and ethnicity also provided a level of power in relation to PLCs. The role of the
553 facilitator in PLCs is to seek a balance between new concepts with prior experiences and to
554 push teachers at appropriate points in an effort to maximize learning (Poekert 2011).
555 Effective facilitators guide rather than direct, question rather than show the way, and listen
556 rather than tell (Patton & Parker 2014; Parker and Patton 2017), yet have the critical role of
557 managing group dynamics (Molle 2013). Among other things, in order to develop trust and
558 respect, participants should have an equal voice in conversations (Hunuk, Ince and Tannehill
559 2013) and actions must be taken to equalize opportunities and engagement where a power
560 differential traditionally exists (Patton, Parker and Neutzling, 2012). Armour and Yelling

561 (2007) described the intricacies of doing this stating that effective, professional development
562 providers ‘need to tread a careful line, simultaneously being leaders (providing expert input,
563 helping teachers to work together) and followers’ (195). While these issues occur in face-to-
564 face communities, controlling and limiting the domineering behaviours presented in social
565 media environments may be more complex and require even more skill in facilitation. These
566 findings therefore further stress the importance of professional development for facilitators or
567 moderators in social media contexts (Makopoulou, 2017).

568 Although this study has demonstrated impact, several limitations exist. Firstly, only a
569 small sample of practitioners were interviewed from a broader sample of participants. While
570 the potential for generalizability was addressed, a wider sample could have provided further
571 insights. A second limitation concerns the generation of empirical data from one collective
572 #pechat. To understand the nature and form of a PLC over time, data could be generated
573 from Twitter over a series of #pechats.

574 **Conclusion**

575 Teachers access to, and engagement with high quality, PD has been an enduring issue. Social
576 media can overcome some of the barriers to teacher PD. The findings reported are from a
577 diverse and international sample and provide evidence on how teacher learning occurs via
578 social media, and the characteristics of social media-based groups or communities that
579 influence knowledge and behaviour change. Hence, the findings indicate that social media is
580 a contemporary form of professional development that can address the clear challenges
581 associated with teacher learning and, in turn, enhance the quality of teaching and improve
582 student learning outcomes.

583

584 **References**

585 Author, 2017; 2014a, Author 2015 (PESP article)

- 586 Armour, K. M. Quennerstedt, F. Chambers, and K. Makopoulou. 2017. "What is 'effective'
587 CPD for contemporary physical education teachers? A Deweyan framework." *Sport,*
588 *Education and Society*, 22(7): 799-811
- 589 Armour, K. M., and M. Yelling 2007. "Effective professional development for physical
590 education teachers: The role of informal, collaborative learning." *Journal of Teaching in*
591 *Physical Education*, 26: 177–200.
- 592 Britt, V.G., and Paulus, T. 2016. "'Beyond the four walls of my building': A case study of
593 #Edchat as a community of practice." *American Journal of Distance Education*, 30(1):
594 48-59.
- 595 Burke, S., 2016. "Rethinking 'validity' and 'trustworthiness' in qualitative inquiry: how
596 might we judge the quality of qualitative research in sport and exercise sciences?" In
597 *Routledge handbook of qualitative research in sport and exercise*, edited by B. Smith and
598 A.C. Sparkes, 330–339. London: Routledge.
- 599 Carpenter, J.P., and D.G. Krutka. 2014. "How and why educators use Twitter: a survey of the
600 field." *Journal of Research on Technology in Education* 46: 414–434.
- 601 Greenhow, C., Campbell, D., Galvin, S. and Askari, E. 2018. Social Media in Teacher
602 Professional Development: A Literature Review. Retrieved February 28, 2019 from
603 <https://www.learntechlib.org/primary/p/182975/>.
- 604 Greenhow, C. and C. Lewin. 2016. "Social media and education: reconceptualising the
605 boundaries of formal and informal learning." *Learning, Media and Technology* 41 (1): 6–
606 30.
- 607 Harvey, S., and B. Hyndman, B. 2018. An investigation into the reasons physical education
608 professionals use Twitter. *Journal of Teaching in Physical Education*, 37(4), 383-396.
- 609 Hodge, K., and L. Sharp. 2016. "Case studies." In *Routledge Handbook of Qualitative*
610 *Research in Sport and Exercise*, edited by B. Smith and A. Sparkes, 62-74. London:
611 Routledge.
- 612 Hunuk, D., M. L. Ince, and D. Tannehill. 2013. "Developing Teachers Health-Related Fitness
613 Knowledge through a Community of Practice: Impact on Student Learning." *European*
614 *Physical Education Review*, 19 (3): 3-20.
- 615 Krutka, D.G. and J.P. Carpenter. 2016. "Participatory learning through social media: How
616 and why social studies educators use Twitter. *Contemporary Issues in Technology and*
617 *Teacher Education*, 16(1): 38-59.
- 618 Krukta, D.G., J.P. Carpenter, and T. Trust. 2017. "Enriching professional learning networks:
619 a framework for identification, reflection and intention." *TechTrends*, 61 (3): 246-252.
- 620 Lave, J., and E. Wenger. 1991. *Situated learning: Legitimate peripheral participation*. New
621 York: Cambridge University Press.
- 622 MacPhail, A., K. Patton, M. Parker, and D. Tannehill. 2014. Leading by example: teacher
623 educators' professional learning through communities of practice. *Quest* 66 (1): 39-56.
- 624 Makopoulou, K. 2017. "An investigation into the complex process of facilitating effective
625 professional learning: CPD tutors' practices under the microscope". *Physical Education*
626 *and Sport Pedagogy*, iFirst.
- 627 Manca, S. and M. Ranieri. 2016. "Yes for sharing, no for teaching!": social media in
628 academic practices. *Internet and Higher Education* 29: 63–74.
- 629 Molle, D. 2013. "Facilitating Professional Development for Teachers of English Language
630 Learners." *Teaching and Teacher Education* 29: 197–207.
- 631 Patton, K., & M. Parker. 2014. "Moving from 'things to do on Monday' to student learning:
632 physical education professional development facilitators' views of success". *Physical*
633 *Education and Sport Pedagogy*, 19(1): 60-75.

- 634 Parker, M., K. Patton, and D. Tannehill. 2012. "Mapping the landscape of practice as
635 professional development in Irish physical education". *Irish Educational Studies*, 31(3):
636 311-327.
- 637 Patton, K., M. Parker, and M. Neutzling. 2012. "Tennis shoes required: The role of the
638 facilitator in professional development". *Research Quarterly for Exercise and Sport*, 83
639 (4): 522–532.
- 640 Parker, M., and K. Patton. 2017. What research tells us about effective continuing
641 professional development for physical education teachers. In *Routledge Handbook of*
642 *Physical Education Pedagogies*, edited by C.E. Ennis, 447-460. New York: Routledge.
- 643 Phoenix, C., and E. Rich. 2016. Visual research methods. In *Routledge Handbook of*
644 *Qualitative Research in Sport and Exercise*, edited by B. Smith and A. Sparkes, 139-151.
645 London: Routledge.
- 646 Poekert, P. 2011. "The pedagogy of facilitation: Teacher inquiry as professional development
647 in a Florida elementary school." *Professional Development in Education* 37 (1): 19–38.
- 648 Ranieri, M., S. Manca, and A. Fini. 2012. Why (and how) do teachers engage in social
649 networks? An exploratory study of professional use of Facebook and its implications for
650 lifelong learning. *British Journal of Educational Technology*, 43(5): 754-769.
- 651 Ross, C.R., R.M. Maninger, K.N. LaPrairie, and S. Sullivan. 2015. "The use of Twitter in the
652 creation of educational professional learning opportunities. *Administrative Issues*
653 *Journal: Connecting Education, Practice and Research*, 5(1): 55-76.
- 654 Sato, T., and Haegele, J.A. 2017. "Professional development in adapted physical education
655 with graduate web-based professional learning." *Physical Education and Sport Pedagogy*,
656 6, 618-631.
- 657 Sparkes, A.C., and B. Smith. 2014. *Qualitative Research Methods in Sport, Exercise and*
658 *Health: From Process to Product*. London: Routledge.
- 659 Smith, M. K. 2009. "Communities of practice. *The encyclopedia of informal education*,
660 www.infed.org/biblio/communities_of_practice.htm.
- 661 Smith, B. and K. R. McGannon. 2017. "Developing rigor in qualitative research: problems
662 and opportunities within sport and exercise psychology." *International Review of Sport*
663 *and Exercise Psychology* iFirst
- 664 Trust, T., D.G. Krukta, and J.P. Carpenter. 2016. "Together we are better": professional
665 learning networks for teachers. *Computers and Education* 102: 15-34.
- 666 Visser, R.D., L.C. Evering, and D.E. Barrett. 2014. "#TwitterforTeachers: The implications
667 of Twitter as a selfdirected professional development tool for K-12 teachers. *Journal of*
668 *Research on Technolgy in Education*, 46(4): 396-413.
- 669 Wenger, E., Wenger-Trayner, B., 2015. *Communities of practice. A brief introduction*.
670 Retrieved from: <http://wenger-trayner.com/introduction-to-communities-of-practice/>.
- 671 Wesley, P.M. 2013. "Investigating the community of practice of world language educators on
672 Twitter." *Journal of Teacher Education* 64: 305–318
- 673 Whitcomb, J., H. Borko, and D. Liston. 2009. "Growing talent: Promising professional
674 development models and practices." *Journal of Teacher Education* 60 (3): 207–212.