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Exploration of the patterns of physical education teachers' participation within self-directed online professional development

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1 **Exploration of the Patterns of Physical Education Teachers' Participation within Self-**
2 **Directed Online Professional Development**

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20 **ABSTRACT**

21 Although physical education (PE) teachers have increased access to digital/online continuous
22 professional development (CPD) activities, there are few robust accounts of how they engage with and
23 experience these environments. **Purpose:** The purpose of this study was to examine PE teachers'
24 participation patterns within self-directed online PE-CPD activities using mobile instant messenger
25 (MIM). **Methods:** Data were generated from (a) 5,246 messages exchanged in the MIM chatroom
26 from 281 teachers, (b) semi-structured interviews with 10 teachers, and (c) 1,275 messages posted by
27 the 10 interviewed teachers. Quantitative data were analyzed for measures of central tendency, and
28 qualitative data were analyzed inductively. **Findings:** Five patterns of PE teachers' uses of MIM were
29 identified: (a) ringmasters, (b) passive uploaders, (c) active uploaders, (d) requesters, and (e)
30 bystanders. **Discussion:** The findings suggest that each engagement pattern illustrates the differential
31 goals of learning, types of interaction, and forms of participation by teachers engaged in online CPD.

32

33 Key words: mobile instant messenger, digital, participation patterns, professional learning

34 There is extensive international evidence that Continuous Professional Development (CPD) is
35 a key mechanism for teachers to learn and develop their practices so as to meet the complex
36 needs of young people today (Darling-Hammond, Hyler, & Gardner, 2017; Groundwater-
37 Smith, 2017; Vangrieken et al., 2017). Ensuring that teachers have access to effective CPD is
38 therefore vital for the growth of teachers and students (Cordingly et al., 2015; Darling-
39 Hammond et al., 2017). Evidence suggests that CPD is most likely to support practitioner
40 learning when it is content-focused, incorporates active learning, supports collaboration, uses
41 models of effective practice, provides coaching and expert support, offers feedback and
42 reflection, and is of a sustained duration (Cordingly et al., 2015; Darling-Hammond et al.,
43 2017). Studies conducted in the area of physical education(PE) also echo these characteristics
44 that effective CPD is on-going and sustained (Parker, Patton, & Tannehill, 2012), includes
45 extended learning opportunities within community (O’Sullivan & Deglau, 2002), and
46 promotes active and collaborative learning (Armour & Makopoulo, 2012; Atencio, Jess, &
47 Dewar, 2012). Characteristics of effective professional development also include concepts of
48 agency and capacity building, whereby adult learners are prompted, encouraged and
49 supported to critically evaluate evidence, inquire into their practices, and develop new
50 insights that are aligned with the needs of their own contexts (Cordingly et al., 2015,
51 Vangrieken et al., 2017). Teacher communities are thereby a powerful context for
52 professional development (c.f. Vangrieken et al., 2017) that can be supported and developed
53 in online and digital spaces (Greenhow & Lewin, 2016; Marcia & Garcia, 2016).

54 A growing body of literature in PE and sport pedagogy recognizes online
55 environments as important contexts for CPD (see Cushion & Townsend, 2018; Gleddie et al.,
56 2016; Goodyear, Casey, & Kirk, 2014; Goodyear, Parker, & Casey, 2019; Harvey &
57 Hyndman, 2018). It has been reported that social media, blogs, and web-based chats
58 overcome some of the cost and time deterrents to engagement with CPD, and that online
59 environments provide ongoing professional support and new opportunities for teachers to

60 engage with the latest evidence-based practices (Calderón, MacPhail, & Meroño, 2019).
61 Calderon et al., 2019; Goodyear et al., 2019; 2014; Harvey & Hyndman, 2018). Nonetheless,
62 the body of evidence on online PE-CPD is limited and contradictory. In particular, there is
63 very limited robust research explaining how and why teachers engage with online PE-CPD or
64 identifying relationships and/or causal links between online PE-CPD, teacher learning, and/or
65 impacts on practice (Cushion & Townsend, 2018; Harvey & Hyndman, 2018). Much
66 uncertainty therefore remains about the effectiveness of online environments for PE-CPD and
67 how teachers should engage with online CPD to support their learning and practices.

68 This study contributes to knowledge about effective PE-CPD by offering
69 new and in-depth insights into South Korean PE teachers' engagement with a self-directed
70 online PE-CPD environment. The specific and original focus is on understanding teachers'
71 online interactions and the different ways in which they engage with self-directed online
72 CPD. A typology of teacher participation in online PE-CPD that explains how different forms
73 of teacher participation shaped engagement is presented. A rigorous mixed methods case
74 study design was utilized to explore 684 teachers' differential levels of engagement with a
75 specific online PE chat group on Kakao Talk, a mobile instant messenger (MIM) medium,
76 where teachers were able to exchange messages in a closed online forum. New data offer
77 insights into the potential benefits and limitations of online and self-directed PE-CPD.

78 Evidence from this study has the potential to inform the development of new ways of
79 facilitating, investigating, and evaluating self-directed online PE-CPD, information that will
80 be relevant to researchers, policy makers, CPD providers (online and offline), schools, and
81 teachers. The research question addressed in this study was, what are South Korean PE teachers'
82 participation patterns within self-directed online PE-CPD activities using MIM?

83 **Teachers' Differential Engagement with CPD**

84 It is well established that teachers have different learning needs, and will engage with CPD in
85 different ways and to different intensities. For example, Goodyear (2017) demonstrated that

86 six teachers in the same PE department had very different learning experiences from the same
87 year-long CPD program delivered in their school and online via social media. Most studies to
88 date that examine online CPD, however, have failed to account for the varying ways in which
89 teachers participate in online environments (see Carpenter & Krutka, 2014; Harvey &
90 Hyndman, 2018). Data have been collected predominantly from surveys, which do not
91 provide sufficient evidence on the varied, multi-layered, complex, and dynamic ways in
92 which individuals participate in online environments (Greenhow & Lewin, 2016) and in CPD
93 (see de Vries, Jansen, & Grift, 2013; Goodyear, 2017; Yoon & Armour, 2017). To better
94 understand how contemporary teachers' learning and practices can be supported in optimal
95 ways, new and in-depth insights are required into the different ways in which different
96 teachers participate in self-directed online PE-CPD environments (Goodyear et al., 2019;
97 Harvey & Hyndman, 2018).

98 Similar to the analysis of teacher professional learning communities on social media
99 by Goodyear et al. (2019), the framework for the landscape of professional learning
100 communities (PLCs) developed by Parker, Patton, and Tannehill (2012) and MacPhail, Patton,
101 Parker, and Tannehill (2014) provided a conceptual map to guide an analysis of how different
102 teachers participate in online CPD. This category-based framework, which is grounded in
103 situated learning theory, identifies different forms of PLCs that are created from the practices
104 of different participants who together shape the characteristics of particular learning
105 environments. Depending on five critical characteristics of success, guideposts, facilitators,
106 roadblocks, and potential, the PLCs have been categorized as collection of teachers,
107 established groups, and communities of practice.

108 Notably, in the account given by Lave and Wenger (1991) of legitimate peripheral
109 participation in situated learning, two key groups of individuals within a group were
110 identified: newcomers and old-timers. These individuals learn the shared routines and

111 practices of a community through their participation within it, while their new and/or
112 old/traditional practices shape the shared practices of the collective community as it evolves.

113 To understand how different teachers engage with online CPD, Parker et al. (2012)
114 and MacPhail et al. (2014) suggested that we should consider the practices that exist within
115 different online groups or communities, and whether there are specific individuals who
116 exhibit particular practices. Hence, and building on the application of the framework by
117 Goodyear et al. (2019) to investigate a social media PLC, the professional learning landscape
118 was applied in the present study to interpret the different types of practices of teachers within
119 the MIM. For example, the framework guided an analysis of whether there were internal
120 leaders within the MIM, and/or which participants were involved in the acquisition of new
121 ideas. In the discussion, the framework is further explored to illustrate how the data analysis
122 process allows one to expand on the characteristics inherent within the PLC framework for
123 cases when online mediums are considered in relation to CPD.

124 **Methods**

125 **Research Design**

126 A case study design was adopted to provide a contextually grounded, holistic, and detailed
127 account (Hodge & Sharp, 2016) of South Korean PE teachers' participation within a self-
128 directed online PE-CPD community. In South Korea PE is a compulsory subject for children
129 and young people between the ages 9-16. A teacher competency evaluation system and
130 mandates for CPD also exist making the CPD participation rates for South Korean teachers
131 higher than the average for Organization for Economic Cooperation and Development (OECD)
132 countries (c.f. Lee et al., 2019). For example, following four years of employment, all PE
133 teachers are mandated to undertake 90 hours of formal CPD provided by the local education
134 office to progress in their professional grading. In addition, the Korean government provides
135 each teacher with \$220 for CPD per year. As has been reported elsewhere (c.f. Lee et al.,
136 2019), PE-CPD tends to be institution-based and sport skills focused, where engagement is

137 influenced by teaching experience. In sum, there is a strong emphasis on accountability and
138 teacher quality within a formalized CPD policy, and thus a case study design was appropriate
139 to provide an in-depth analysis into the specific South Korean PE-CPD context.

140 The case was defined at the level of a Kakao Talk chatroom that included 684 Korean
141 PE teachers at the time of the study. Kakao Talk provides not only the chat feature, through
142 which users can exchange text, but also a range of other functions, such as photo and video
143 sharing and group discussion. PE teachers in South Korea have been utilizing Kakao Talk as
144 an unofficial and voluntary CPD tool for the past decade (Lee, Choi, Son, & Lee, 2018). A
145 Kakao Talk chatroom was therefore selected as an appropriate case study to examine South
146 Korean teachers' participation in self-directed online PE-CPD, with the case study focus
147 considered to be transferable to other teachers' usage of online mediums for CPD in different
148 international contexts.

149 **Ethics**

150 The research protocol was reviewed and approved by the institutional review board of the first
151 author's university. Data collection procedures and methods aimed to ensure participants'
152 safety, privacy, and dignity while promoting their autonomy. Passive consent was sought
153 from all members of the PE Kakao Talk chat group. Similar to other Internet research studies
154 (see McKee & Porter, 2009), passive consent was obtained by posting a message in the group
155 notifying teacher participants that the chat group was part of a research study. Participant
156 teachers were notified that the messages posted in the group from January 2017 to December
157 2017 would be analyzed for research purposes. The passive consent information also stated
158 that the messages posted by teacher participants would not be individually quoted, and that
159 only general quantitative trends and overall patterns were to be analyzed. Furthermore, the
160 passive consent message informed teachers that if they did not want their data to be included
161 in the research they should individually contact the lead researcher by clicking the link that
162 was provided in the message, which led the user to an online form. None of the teacher

163 participants refused to participate in the study. To generate in-depth insights into the chat
164 community, active informed consent was sought from 10 teacher participants who were
165 selected by the researchers for interviews. These selected teachers participated in interviews
166 and provided consent to collect, analyze, and report on their messages within Kako Talk.
167 Legal conditions were followed for exporting data from the chat group. Pseudonyms have
168 been used in the reporting of the findings.

169 **Participants and Data Sources**

170 At the time of this study (2017), Kakao Talk had 684 PE teacher users. Data were collected
171 between January 2017 and December 2017. The data collection took place in three phases,
172 with an iterative design used to ensure the rigor and generalizability of participants' reported
173 experiences of Kakao Talk.

174 The purpose of Phase 1 was to understand the general pattern and trends of teacher
175 participation within Kakao Talk by analyzing the messaging behavior of all members. During
176 the 12 months of data collection, 5,246 messages were posted and subsequently exported for
177 analysis.

178 The purpose of Phase 2 was to understand the different ways in which teachers
179 participated in Kakao Talk and the teachers' perceived value of participation in MIMs for
180 online PE-CPD. For Phase 2, a purposeful sampling strategy was adopted to select 10
181 teachers for interview. The sampling criteria were based on balancing gender, academic
182 degree, participation styles in Kakao Talk (as identified in Phase 1), and teaching experience.
183 Despite the differences in the number of teachers among five different participation styles, an
184 equal number of participants (n=2) was selected from each group to represent balanced
185 perspectives among the 10 participants. Although the vast majority of teachers were either
186 bystanders or requesters, the average number of messages posted by individual teachers
187 within these two groups (bystanders and requesters) was much lower than those identifying as
188 ringmasters and uploaders, which provided rationale for selecting equal number from each

189 participation style. The gender and teaching experience distribution of selected teachers were
190 similar to the overall distribution of chatroom participants.

191 The background information of the 10 participants selected to be interviewed is shown
192 in Table 1. The activities the teachers conducted in the MIMs, the materials exchanged in the
193 MIMs, and the advantages and disadvantages of using MIMs for CPD were discussed during
194 the semi-structured interviews. The face-to-face interview took approximately one hour per
195 participant. It also were recorded and transcribed verbatim.

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197 **Place Table 1 About Here**

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199 The purpose of Phase 3 was to better understand the content of the messages that the
200 10 teacher participants shared in the MIM chatroom. In addition to the interviews, the content
201 of the messages exchanged in the MIM chatroom by the 10 teachers were analyzed. A total of
202 1,275 messages were posted by the 10 teachers. The messages were then exported as text and
203 analyzed for content and characteristics.

204 **Data Analysis**

205 The MIM messages and in-depth interviews were analyzed through inductive categorical
206 analysis (Corbin & Strauss, 2008). First, the chatroom messages were retrieved as text and
207 entered into the NVivo program. Descriptive analysis was conducted regarding the function
208 (e.g., encouraging, sharing) of messages. The analysis of the function of the messages
209 revealed the styles of each teacher's participation in the chatroom. Five different patterns of
210 participation emerged through text analysis, and the number of teachers identifying with each
211 participation style and the number of messages posted by each participation style group were
212 counted for the general trend analysis.

213 Second, the transcribed interview data from the 10 selected teacher participants were
214 repeatedly read while separately marking meaningful words and sentences. Initial codes were

215 created based on repeated words and keywords, then compared with each other to categorize
216 them into groups with the same attributes for focused coding. The appropriateness of the
217 classification was checked based on the similarity between the codes through consultation
218 between the researchers, and the analytic memos taken to reflect on the concepts. In addition,
219 all messages posted by the 10 teachers who participated in the interviews were exported as
220 text, and the content, format of exchanged material, and function of the messages were
221 analyzed and counted to reveal specific trends. Overall, through this analysis process five
222 themes and five participation styles were identified. These are reported in the findings section,
223 and they are theorized in relation to PLCs in the discussion.

224 **Validity**

225 A relativist approach was applied to guide validity of the data analysis process and to extend
226 the robustness of traditional measures of quality, such as trustworthiness (Smith & McGannon,
227 2018). In this study, therefore, a list of characterizing traits were selected by the research team
228 to guide validity, rigor, credibility, and coherence. The validity was guided by the originality
229 and significance of the topic, and the rigor was checked in relation to the breadth of the
230 dataset, collected from different sources and diverse participants. The credibility was guided
231 through the analytical process being undertaken by multiple researchers from diverse
232 disciplinary and international contexts, which strengthened the generalizability and
233 transferability of the research findings. Finally, the coherence was checked through the
234 alignment between aims, methods, and outcomes, and in relation to the appropriate definition
235 and critical engagement with theory (i.e., PLCs and situated learning).

236 **Findings**

237 Five themes were identified and thus five different ways in which the teachers participated in
238 Kakao Talk: (a) ringmasters, (b) active uploaders, (c) passive uploaders, (d) requesters, and
239 (e) bystanders. Table 2 outlines these different types of participation and explains their
240 characteristics. Among the 684 teacher participants in Kakao Talk at the time of the study,

241 most were categorized as bystanders ($n = 403$; 58.9%), followed by requesters ($n = 170$;
242 23.9%), passive uploaders ($n = 56$; 8.2%), active uploaders ($n = 53$; 7.7%), and ringmasters (n
243 $= 2$; 0.3%). However, the majority of messages were posted by uploaders, followed by
244 requesters and ringmasters, with no visible traces from bystanders (see Table 2).

245
246 Place Table 2 About Here
247

248 **Ringmasters**

249 Ringmasters are the teacher participants who created and managed the MIM chat on Kakao
250 Talk. This category of teacher participants was the smallest of the five participant groups,
251 which included only two participants (0.3%). These teachers were identified as leaders and
252 “experts” in PE.

253 In terms of leadership skills, there was evidence that Kakao MIM chat was created by
254 the ringmasters to enhance teacher learning: “I made the chatroom using Kakao Talk because
255 I wished communications and sharing among teachers to occur more quickly and actively”
256 (Interview, T1, male, 43 years old). The ringmasters’ knowledge and status were reported to
257 be influential in terms of encouraging other teachers to engage with the MIM chat. According
258 to one participant interviewd,

259 There should be no PE teacher who does not know him. He appeared in TV programs
260 on the subject of PE and published physical education textbooks. I think that
261 hundreds of persons participate in the Kakao Talk because he created the chatroom.
262 (Interview, T7, Female, 24 years old)

263 The ringmasters also played a key role in facilitating dialogue among the teacher
264 participants. Despite there being very few teachers in the ringmaster category, these teachers
265 accounted for 7.8% ($n = 409$) of all messages exchanged during the academic year. The
266 ringmasters’ messages were primarily focused on managing interactions and discussions, and

267 maintaining an appropriate code of conduct for online interactions. For example, the
268 ringmasters aimed to protect the confidentiality of the teacher participants (e.g., “Please do
269 not post material including personal information”—Message from T2) while also encouraging
270 the teacher participants to share resources (e.g., “Teachers, please do not hesitate to share the
271 class materials. Through your courage, our community grows”—Message from T1). Through
272 these interactions, the ringmasters played a key role in formulating the ongoing interactional
273 dynamic of MIM chat.

274 **Active Uploaders**

275 Active uploaders refer to the teacher participants who uploaded materials voluntarily and
276 without requests from other teacher participants. This category included 53 teacher
277 participants (7.8%), who sent 2,402 messages during the data collection period, accounting
278 for 45.8% of the messages exchanged. Data collected from the interviews identified that the
279 active uploader teacher participants were driven to share their resources to support other
280 teachers’ learning and practices. A major advantage of the chat was that it could overcome
281 some of the drawbacks of accessing resources shared in offline CPD workshops. For example,
282 an active uploader teacher observed,

283 Every time I go to the workshop, I see a long line of teachers with USBs who want to
284 download material presented in the session. Like, can I download it with my USB?

285 That is why I post my material in this chatroom to quench their thirst for material
286 quick and easy. (Interview, T3, female, 42 years old)

287 The active uploader teacher participants uploaded a range of different content in the
288 form of materials to Kakao Talk (see Table 2). Most of the material shared was related to
289 lesson content, for example, tactical gameplay suggestions and teaching materials to support
290 dance-based activities. The materials were posted at appropriate times for annual school
291 events. For example, “teachers, here comes the athletic event season! Please refer to attached
292 documents for organizing a tournament” (Message from T4). Although there were advantages

293 to the active uploaders sharing resources, at times, this caused some teacher participants to
294 feel overwhelmed with the vast amount of resources. In some cases, participants considered
295 leaving the chat group because of the constant sharing of content. For example, “sometimes
296 one person indiscriminately sends dozens of materials at a time. Honestly, who would read
297 them? Only reminders keep ringing. At such times, I really feel like leaving the Kakao Talk
298 chatroom” (Interview, T9, male, 41 years old).

299 In summary, the active uploader teacher participants posted material without being
300 asked by others, and this provided a foundation for the MIM chatroom resource bank. Despite
301 good intentions, unidirectional posts made by active uploaders were sometimes perceived by
302 others as frustrating due to the challenges of navigating vast amounts of content.

303 **Passive Uploaders**

304 Passive uploaders refer to the teacher participants who uploaded materials when requested by
305 another participant. This category comprised 56 teacher participants (8.2%; see Table 2).
306 These participants sent 1,731 messages, which accounted for 33% of the messages exchanged
307 during the data collection period. These teacher participants perceived that they could only be
308 a member of the Kakao Talk if they uploaded materials. For example,

309 I did not have my presence in the Kakao Talk, where hundreds of people were active.
310 I came to think that I became a member of this chatroom only after I uploaded
311 materials and I began to actively participate thereafter. (Interview, T5, male, 31 years
312 old)

313 Uploading resources or ideas did not occur immediately. The teacher participants reported
314 that they needed to observe what other materials had been uploaded to overcome feelings
315 associated with shame or embarrassment. For example,

316 I wrote a long message about a question related to the student athletic club. But I
317 could not press the “send message” button. I was ashamed of the fact that others
318 would read my message as I am not smart and I was embarrassed without reason.

319 (Interview, T5, male, 31 years old)

320 Before I upload my material, I compare it with others' materials. When others'
321 materials seem better, I give up bravely. Why should I upload it when it will make
322 me feel ashamed? (Interview, T6, male, 32 years old)

323 In addition to sharing materials, the teachers in the passive uploader category
324 mediated conversations between teacher participants. The passive uploader teacher
325 participants identified and introduced teacher participants to share relevant expertise. For
326 example, when a teacher shared difficulty in teaching physical expression activities, a passive
327 uploader posted a message such as, "teacher Kim is an expert in expressive activities. If you
328 need help, I can connect you to him" (Message from T5). In this way, passive uploader
329 teacher participants bridged requesters and expert teachers. In addition, when teachers shared
330 an issue of student resistance or disengagement issue, the passive uploader teacher provided
331 encouragement such as, "you should have been much distressed. However, you should not
332 lose your courage and take heart until the end" (Message from T6).

333 Overall, the passive uploader teacher participants played a key role in contributing to the
334 developing practices of the chat group through sharing materials and offering support to other
335 teacher participants.

336 **Requesters**

337 Requesters refer to the teacher participants who asked questions and requested materials from
338 other participants of Kakao Talk. This category included 170 teacher participants (24.9%),
339 who shared 704 messages (13.4%) during the data collection period. The requester teacher
340 participants sought out a range of different information from Kakao Talk teacher participants.
341 Similar to the active uploaders, most of the material requested related to lesson content and
342 administrative tasks.

343 The requester teacher participants reported that a key advantage of the Kakao Talk
344 community was the accessibility of information. In particular, it was reported that information

345 could be obtained immediately. For example,

346 I think I came to rely on the community further because information has been
347 provided more quickly than when I asked my fellow teacher at the same school. In
348 some cases, it takes really less than 10 seconds for a question to be answered.

349 (Interview, T7, female, 24 years old)

350 Besides the accessibility of information, requesters believed that the quality of
351 information provided in the chatroom would be trustworthy because it was being constantly
352 cross-checked by other chatroom members. For example,

353 I am sure that the information posted here will be high quality because people can't
354 share material in a chatroom with hundreds of teachers without confidence. There
355 will be always someone who is smarter and let us know when it is incorrect.

356 (Interview, T8, male, 36 years old)

357 Although the accessibility of information was valued, some of the teacher
358 participants were concerned about their visibility and presence in Kakao Talk. Concerns were
359 noted that others could see their questions. For example,

360 When I ask a question, more than 600 teachers see my question at the same time. I
361 am afraid that my weakness may be revealed in this chatroom. So every time I post a
362 question, I check whether it is appropriate or not. It's kind of self-censorship.

363 (Interview, T7, female, 24 years old)

364 Overall, the requesters contributed to the maintenance of the community by
365 promoting the sharing of information and resources. The requesters were attracted to the
366 online environment because they could obtain rapid responses and reliable information from
367 multiple people.

368 **Bystanders**

369 Bystanders refer to the teacher participants who did not post any messages to Kakao
370 Talk. This teacher category consisted of 403 (58.9%) teacher participants. Bystanders stayed

371 in the chatroom due to a sense of belonging and psychological safety arising from
372 connectedness with other teachers. For example, “I think I feel some psychological stability
373 just from the fact that I belong to this space together with physical education teachers all over
374 the country (Interview, T9, male, 41 years old). Another teacher also said, “I cannot easily
375 leave the room. Many physical education teachers are gathered there, who may be helpful
376 someday. It is insurance” (Interview, T10, female, 25 years old).

377 Regarding their reasons for staying invisible in the Kakao Talk chatroom, bystander
378 teachers indicated that the size of the chatroom, shyness, and minimizing interruption by
379 avoiding duplicate messages led them to remain silent. For example, “It is the biggest
380 chatroom among PE teachers. Just imagining the message I posted is shared with hundreds of
381 teachers made me overwhelmed. It is different with small-scale chatrooms. Plus I am an
382 introverted person” (Interview, T9, male, 41 years old). Similarly, another bystander
383 observed,

384 I don’t feel the need to post messages because most of the information I need is
385 already there. There is always someone who either requests or provides material that I
386 need. If I post a message, it will be redundant and interrupt other people. (Interview,
387 T10, female, 25 years old)

388 Although they left no visible traces of activities in the chatroom, bystander teachers
389 searched for and retrieved relevant information from the chatroom and spread the material to
390 other teachers in offline contexts. They even invited other teachers to the chatroom, as they
391 recognized the benefits of participating. For example,

392 I tried to download material as much as possible because it can be useful someday.
393 Sometimes, I pass around the material obtained from chatroom to my colleagues as
394 needed. In addition, I invited many of my juniors to join. When I told them that just
395 looking at the materials exchanged should be greatly helpful for them in adapting to
396 school life as newly appointed teachers, all of them were pleased. (Interview, T10,

397 female, 25 years old)

398 In summary, bystanders used the chatroom to obtain a sense of belonging and stay up
399 to date on the latest information without posting any messages. The bystander teacher
400 participants shared the information they had obtained from the chatroom with other teachers
401 offline. It shows that bystander teachers are engaged in MIM chatroom in a strategic way to
402 meet their needs yet play a role for the maintenance of the chatroom by inviting other teachers
403 and spreading information.

404 **Discussion**

405 The purpose of this study was to examine PE teachers' participation patterns within self-directed
406 online PE-CPD activities using mobile instant messenger (MIM). From gathering data on teachers'
407 perspectives and their online interactions, five engagement patterns were identified:
408 ringmasters, active uploaders, passive uploaders, requesters, and bystanders. Each
409 engagement pattern illustrates the different goals of learning, types of interaction, and forms
410 of participation within the chatroom, which ranged from individual enrichment to community
411 building, and from being a recipient to being a major contributor. Although there were
412 different levels of engagement, as indicated by the frequency of messages posted in the
413 chatroom, each group of teachers played unique roles in the sustainable development of the
414 mobile chatroom group by, for example, leading discussions, sharing resources, requesting
415 and responding to messages, and promoting the group to other teachers and/or inviting other
416 teachers to the online group. The key challenge for the development, organization, and
417 facilitation of online self-directed PE-CPD is therefore to ensure that online environments are
418 designed and developed in ways that promote and support teachers' varying purposes in
419 joining the group, diverse learning needs, and online engagement patterns.

420 Overall, the data illustrated how PE teachers' participation in self-directed online PE-
421 CPD was influenced by technological and professional factors. The technological affordance
422 of MIM helped teachers exchange multimedia resources, including text, documents, music,

423 and video clips, without the limitations of time and place that are often reported as barriers to
424 engaging in professional development in offline contexts (Armour, Quennerstedt, Chambers,
425 & Makopoulou, 2017). Unlike offline formal CPD, participants controlled their degree of
426 participation because both autonomy and anonymity were supported by the features and
427 structure of the MIM chatroom (Blitz, 2013; Tang & Hew 2019). Furthermore, the data
428 reported in this study indicated that the PE teachers participated in self-directed online CPD
429 for professional reasons, including the ability to access instructional resources to develop their
430 teaching practices and network with other teachers to obtain social support. Interestingly, the
431 self-directed online CPD environment met the needs of teachers who felt isolated in their
432 school contexts, and the online environment was also a preferred learning method for PE
433 teachers who struggled to engage with face-to-face learning (Kim, 2003; Lee & Kim, 2010).
434 These findings build on previous studies conducted with other online tools, such as social
435 media (e.g., Twitter; Goodyear et al., 2014; Goodyear et al., 2019; Harvey & Hyndman, 2018;
436 Willet, 2019), and further highlight the value and importance of online PE-CPD in the lives
437 and careers of the current generation of PE teachers.

438 Based on the data generated and reported, the findings demonstrate how the MIM-
439 based online PE-CPD was representative of an established group of teachers (MacPhail et al.,
440 2014). Similar to CoPs and the notion of a shared repertoire, there was evidence that different
441 teacher participants had different roles that contributed to the overarching aim of the
442 chatroom, which is to offer professional development. There was also a sense of legitimate
443 peripheral participation as teachers were invited to join the chatroom and moved from being
444 newcomers into one of the engagement pattern roles. As for guideposts supporting the success
445 of online PE-CPD, there was evidence of expressions of gratitude and recognition from other
446 teachers and of social support, which is similar to the findings from studies of off-line CPD
447 (Parker et al., 2012). However, a key limitation of the established group was that there was no
448 system to verify the quality of information in the chatroom because teachers were reluctant to

449 mention the quality of information in the many-to-many online chatroom (Jensen & Helles,
450 2011). This lack of verification of information can be considered a serious roadblock because
451 there is no way to identify whether posted resources are the original creation of uploaders or
452 material obtained from other teachers, or whether they reflect evidence-based knowledge.
453 Another barrier and a potential roadblock is the shame and embarrassment experienced by
454 passive uploaders given that the establishment of trust and a safe but challenging learning
455 environment (Patton & Parker, 2017) is essential to professional learning community.
456 Similarly, requester teachers were concerned about revealing their weakness in the chatroom
457 thus practiced a high level of self-censorship.

458 The analysis of the data in relation to the framework proposed by MacPhail et al.
459 (2014) and concepts related to facilitation, success, and potential further illustrate that the
460 MIM was an established group. Firstly, the chatroom was facilitated by the ringmasters, who
461 set the norms of the online community and encouraged the exchange of ideas. Previous
462 research, however, suggests in addition to providing the basic communication structure and
463 encouraging active and positive communication between participants, facilitators should
464 provide thoughtful and in-depth questions to guide teachers' reflections if they are to support
465 impacts on learning and practice (Patton, Parker, & Pratt, 2013). Although some pedagogy of
466 facilitation strategies identified from formal offline CPD programs can be beneficial, the
467 nature of massive online CPD requires specific strategies relevant to the online environment.
468 Secondly, and in relation to the concept of success, evidence from the MIM participants
469 highlights that the MIM had an accomplished objective, and that different members of MIM
470 supported empowerment. For example, there was a clear shared purpose that engagement in
471 MIM was for CPD, and that sharing resources was a central mechanism of learning and
472 supporting other MIM participants. Thirdly, in relation to potential, the data suggest that the
473 MIM groups were at an intermediate phase of changing isolated classroom practices and
474 change in school culture and PE. There was evidence of both in the data sets, and further in-

475 depth data collected over a sustained period of time could have provided more definitive
476 answers on the positioning of success in relation to the framework. For these reasons and
477 because of the factors related to success, guideposts, roadblocks, facilitators, and potential the
478 chatroom is conceptualized as an established group.

479 Building on the theoretical framework of PLCs, grounded in situated learning
480 theories (see McPhail et al., 2014), the data generated from this study elucidate the
481 importance of a better understanding of the notion of bystanders (or “lurkers;” see Goodyear
482 et al., 2019): those who engage passively and do not actively interact within communities
483 (Table 2). Furthermore, lurking and the behaviors of the bystander participants (Table 2) are
484 particularly important to understand within Korean culture, where teachers often avoid
485 standing out and refrain from asking questions because these actions can be considered a sign
486 of weakness. The “vicarious response” is a prevalent aspect of the culture among Korean
487 teachers and is a way to maintain harmony within a group by withholding individual opinions
488 (Lee & Kim, 2010). However, many of the concepts across theoretical frames focus on the
489 relationship between learning and interactions, with a lack of interaction (or active
490 participation) often associated with limited engagement and, in turn, little or no impact on
491 learning and practice. Furthermore, bystanding or lurking is often perceived in a negative
492 sense as indicating a lack of a willingness to learn and contribute to the community. Data
493 from this study, however, challenge how we conceptualize the relationships between
494 interaction and learning in online communities for passive participants. It was evident in the
495 data that bystander teacher participants were contributing to the goals of the community
496 although their level of learning cannot be assumed and was not a focus of this study.
497 Therefore, it seems that different metrics and concepts should be used to measure bystanders’
498 engagement and learning, and in ways that focus on more passive forms of engagement, with
499 such concepts likely to challenge the social constructivist/situated learning perspectives that
500 are often used to explain community-based approaches.

501

Conclusion

502 This study examined PE teachers' participation patterns within self-directed online PE-CPD activities
503 using MIM. The online environment comprised different groups of teachers who had different
504 motivations and needs for professional development. It showed the potential for the rapid
505 exchange of ideas and resources and for controlling the degree of participation based on the
506 different needs and motivations of different teachers. In addition, the emphasis on speed
507 rather than quality of information, the pursuit of quick fixes rather than the exchange of
508 critical discourse and reflection, replicated the individualistic school cultures in offline
509 contexts (Lee et al., 2019). Accordingly, this study builds on established features of effective
510 CPD in general (c.f. Darling-Hammon et al., 2017) and in PE-CPD (Armour et al., 2017) by
511 illustrating them in an online context.

512 The findings of this study have the following implications for future online-based
513 CPD research. First, this study only examined teachers' engagement patterns with a single
514 year of data and the five engagement patterns identified in this study can be transient rather
515 than static; future studies should explore how the roles and functions of individual teachers
516 change over a longer term. Tracking the engagement patterns of individual teachers over a
517 long period will provide insights into how teachers are learning and growing within the online
518 environment.

519 Second, studies on the spillover effects of self-directed online PE-CPD should be
520 explored. Although the majority of participants may remain silent, the ideas exchanged in the
521 online environment can be a catalyst for their self-reflection, or serve as seed beds for small
522 group online communities and/or offline teacher learning communities. These studies will
523 provide information on the impact and influence of self-directed online CPD on teachers'
524 professional development beyond online communication.

525 Finally, given that this study only examined how and why teachers are participating in
526 self-directed online CPD, future research should explore how this participation influences

527 teachers' changes in knowledge and practices as well as student learning outcomes.
528 Specifically, teachers' changes and the impact on student learning should be examined in
529 relation to teachers' participation patterns because different groups of teachers have different
530 ways of learning and participating. Such research will inform researchers and practitioners in
531 developing facilitation strategies tailored to each group of teachers to maximize teachers'
532 learning and student learning outcomes.

533

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Table 1. In-depth interview participants' background information

Category		Number
Gender	Male	6
	Female	4
Academic degree	Bachelor's	5
	Master's	5
Teaching experience	1–5 years	4
	6–10 years	2
	11–15 years	3
	16 years ~	1

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639 Table 2. Styles of physical education teachers' participation in MIMs

Participation styles	Chatroom behaviors	Number of teachers (%)	Number of messages posted by teachers (%)
Ringmasters	Creates and manage the chatroom	2 (0.3)	409 (7.8)
Uploaders	Active Voluntarily uploads material in the chatroom without request from other teachers	53 (7.7)	2,402 (45.8)
	Passive Uploads material when requested by another participant	56 (8.2)	1,731 (33)
Requesters	Asks questions and requests material from other teachers	170 (24.9)	704 (13.4)
Bystanders	Presents in chatroom but makes no comment	403 (58.9)	0 (0)
Total		684 (100)	5,246 (100)

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