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

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DOI:

[10.1123/jtpe.2020-0058](https://doi.org/10.1123/jtpe.2020-0058)

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Document Version

Peer reviewed version

Citation for published version (Harvard):

Lee, O, Choi, E, Goodyear, V, Griffiths, M, Son, H, Jung, H & Lee, W 2021, 'Exploration of the patterns of physical education teachers' participation within self-directed online professional development', *Journal of Teaching in Physical Education*, vol. 40, no. 4, pp. 618-625. <https://doi.org/10.1123/jtpe.2020-0058>

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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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16 Date of Submission: March 17, 2020

17 Date of Revision Submission: June 21, 2020

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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

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

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

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

Teachers' Differential Engagement with CPD

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

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

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

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

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

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

Methods

Research Design

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

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

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

Ethics

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

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

Participants and Data Sources

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

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

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

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

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

Place Table 1 About Here

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

Data Analysis

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

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

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

Validity

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

Findings

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

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

Place Table 2 About Here

Ringmasters

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

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

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

The ringmasters also played a key role in facilitating dialogue among the teacher participants. Despite there being very few teachers in the ringmaster category, these teachers accounted for 7.8% ($n = 409$) of all messages exchanged during the academic year. The 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

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

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

Passive Uploaders

Passive uploaders refer to the teacher participants who uploaded materials when requested by another participant. This category comprised 56 teacher participants (8.2%; see Table 2).

These participants sent 1,731 messages, which accounted for 33% of the messages exchanged during the data collection period. These teacher participants perceived that they could only be a member of the Kakao Talk if they uploaded materials. For example,

I did not have my presence in the Kakao Talk, where hundreds of people were active.

I came to think that I became a member of this chatroom only after I uploaded materials and I began to actively participate thereafter. (Interview, T5, male, 31 years old)

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

I wrote a long message about a question related to the student athletic club. But I could not press the “send message” button. I was ashamed of the fact that others 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,

female, 25 years old)

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

Discussion

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

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

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

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

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

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

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

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

Conclusion

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

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

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

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

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

Acknowledgement

This work was supported by Global Research Network program through the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2016S1A2A2912046).

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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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