

1 Japanese Elementary Teachers' Professional Development Experiences in Physical Education
2 Lesson Studies

3
4 **Abstract**

5 *Background:* Formal and informal professional development has played a central role in
6 teachers' growth in Japan for many decades (Collinson and Ono, 2001). This is especially true
7 for elementary school teachers, who are not licensed in a specific subject area. In Japan, teachers
8 are trained for each school level separately, including kindergarten, elementary, secondary
9 schools, and special needs education (Ministry of Education, Culture, Sports, Sciences and
10 Technology [MEXT], 2018). The lack of in-depth subject-specific training is a challenge for
11 elementary school teachers, who are responsible for teaching all subject areas. For many
12 decades, school districts have used a *lesson study* approach. In Japan, lesson study (emerged in
13 the 1920s as professional development opportunities for in-service teachers) helps various types
14 of knowledge become more visible for teachers, which might include colleagues' and mentors'
15 feedback and suggestions about pedagogy and students' reflective and critical thinking. This also
16 allows teachers to encounter new or different ideas and to refine their knowledge (Lewis, Perry,
17 and Hurd, 2009). The purpose of this study was to investigate Japanese elementary teachers'
18 professional development (lesson study) experiences using the conceptions of andragogy in
19 physical education (PE) in a metropolitan school district.

20 *Participants and setting:* Six participants were selected from one elementary school located in a
21 metropolitan city in Japan. There were (a) 2 lesson study presenters, (b) 1 mentor, (c) 1
22 professional development coordinator, (d) 1 school principal, and (e) 1 school district PE
23 coordinator. Approximately 600 children were enrolled in the school, and there was a total of
24 33,506 elementary children in the school district.

25 *Research design:* The research method was descriptive-qualitative, using an in-depth, semi-
26 structured interviewing approach (Seidman, 1998).

27 *Data analysis:* A thematic analysis method (Fereday and Muir-Cochrane, 2006) was used to
28 explore, describe, and interpret the data. This allowed the researchers to uncover emergent
29 themes in the data. In the conceptions of andragogy, through thematic analysis, the researchers
30 searched for key or meaningful phrases or words that expose the characteristics of in-service
31 teachers.

32 *Findings:* Explainable by the conceptions of andragogy, three major interrelated and complex
33 themes emerged from the data analysis: (a) *challenges*, (b) *vitalness of a mentor's role*, and (c)
34 *self-directed learner*. The lesson study approach is an effective way for teachers to reflect on
35 their instruction and promote instructional change. To continue to support teachers to improve
36 their quality of instruction, there is an ongoing need to heighten awareness among teachers,
37 administrators, and researchers to ensure that attention is directed to the learning outcomes of
38 children.

39 **Keywords:** Lesson study, Elementary education, Adult Learning, and Professional development

40 **Word Count: 413**

41

Introduction

The importance of continuous learning among teachers has been frequently recognized in the field of physical education (PE) across countries (Armour and Yelling, 2004; 2007; Armour, Quennerstedt, Chambers, and Makopoulou, 2017; Ko, Wallhead, and Ward, 2006; Rink, 2012). Globally, various forms of professional development (PD) approaches have been adopted. For example, Sato and Haegele (2018), and Sato, Haegele, and Foot (2017) studied PE teachers' PD learning through online courses in the United States (U.S.). In Singapore, the Ministry of Education emphasized the "Teacher Growth Model," which encourages in-service PE teachers to participate in PD through a variety of platforms, including distance education, face-to-face courses, workshops, and professional conferences, mentoring and coaching (Bautista, Wong, and Gopinathan, 2015). Currently, in Hong Kong, there are major PE curriculum changes that recommend a shift in focus of all PE from motor skill development or movement education to public health (Ha, Sum, O'Sullivan, Pang, and Chan, 2010). In-service teachers in Hong Kong are required to attend annual two to three-day seminars or summer school and develop new modules that can impact children's health as part of their PD. Japan is known for a collaborative PD model, in particular lesson study, which has gained popularity around the world since its development in the 1920s, when child-centered education was first introduced in Japan (National Association for the Study of Educational Methods, 2009).

Lesson Study in Japan

Lesson study (*jugyo kenkyu* in Japanese) is a well organized PD opportunity that emerged in Japan for in-service teachers (Saito, 2012) has played an especially important role for elementary school teachers in Japan, who are not licensed to teach a specific subject area. The term *jugyo* means *lesson*, and *kenkyu* means *study* or *research*. Lesson study consists of school-based, in-service teacher training, where teachers reflect upon their challenges in refining their instruction

66 to improve student learning (Matoba and Sarkar Arani, 2005). Lesson study makes various types
67 of knowledge more visible through, for example, colleagues' and mentors' feedback and
68 suggestions about pedagogy and students' reflective and critical thinking (Sato, Ellison, and
69 Eckert, 2019). This opportunity allows teachers to encounter new or different ideas and to refine
70 their knowledge (Lewis, Perry, and Hurd, 2009). Stepanek et al. (2007) identify a cycle of lesson
71 study consisting of six processes. First, a teacher selects a topic to teach during the lesson study.
72 Second, the teacher develops a lesson on a self-selected topic. Third, the teacher implements the
73 lesson for his/her students in a school, and other teachers observe the lesson. Fourth, the teachers
74 who observed the lesson provide feedback to the teacher who taught the lesson. Fifth, the teacher
75 who taught the lesson revises it based on the feedback and teaches it again. Lastly, another
76 discussion with the observers is held to reflect upon the second instruction (Coenders and
77 Verhoef, 2018).

78 *PE in the Japanese Elementary School System*

79 Japanese teachers are trained separately for each school level, including kindergarten,
80 elementary, secondary schools, and special needs education in Japan (Ministry of Education,
81 Culture, Sports, Sciences and Technology [MEXT], 2018). Among these school levels, only
82 secondary school teacher licensure is subject-specific. The lack of in-depth subject-specific
83 training is a challenge for elementary school teachers, who are responsible for teaching all
84 subject areas. Moreover, the PD opportunities through lesson study provides critical support for
85 elementary school teachers who are required to rotate to another school every seven years within
86 the prefecture to teach children from diverse backgrounds (Collinson and Ono, 2001). This
87 system is intended to minimize educational disparities among students (Lewis, 1995). However,
88 this mandatory relocation of teachers may create unintentional negative consequences in

89 teachers' lives. For example, teachers are left to cope with the uncertainties of entering new
90 working environments throughout their career, potentially resulting in professional isolation.
91 Additionally, this system makes it difficult for teachers to establish and maintain rapport with
92 students and build relationships with parents (Shimazu, Okada, Sakamoto, and Miura, 2003).
93 The inadequate subject preparation and ever-changing work environments that elementary school
94 teachers in Japan face are potential stressors that might have significant implications for
95 teachers' health and attrition (Shimazu et al., 2003).

96 Japanese elementary schools provide six years of education for children aged from six to
97 twelve, which is also called primary education (Grades 1–6). The school year in Japan starts on
98 April 1 and ends the following March. Children who are six or above on April 1 are eligible to
99 begin their elementary education. The curriculum consists of Japanese, social studies,
100 mathematics, science, life studies, music, arts and handicrafts, homemaking, moral education,
101 and health and physical education (health and PE are combined and considered one subject area
102 in Japan). One teacher is assigned to a classroom, and the teacher teaches all the subject areas,
103 including PE, to the class. PE lessons are typically 45 to 50 minutes, and a total of 90 mandatory
104 hours per year is allocated for health and PE in all public elementary schools (Nakai and Metzler,
105 2005).

106 Japanese PE is underpinned by five characteristics identified by Takahashi (2000), which are:
107 (a) democratic PE, (b) culturally oriented PE, (c) fitness-oriented PE, (d) directing to a lifelong
108 participation in sport, and (e) PE for mind and body. PE also plays a primary role in
109 extracurricular activities, sport events, and sport festivals in schools (Nakai and Metzler, 2005).
110 Hence, PE is situated as an important academic subject area for achieving the overall educational
111 goals (Nakai and Metzler, 2005).

136 self-directed learning. A high expectation of teachers' instructional success may result in
137 teachers' high motivation to learn. Teachers' motivation for learning helps them challenge their
138 own beliefs and assumptions and identify various forms of reflection in the transformation of
139 meanings, structures, context, process, and premise (Mezirow, 2000).

140 Using the conceptions of andragogy, the lesson study can be tailored to meet the interests of
141 teachers by involving them in planning and observing lessons to solve pedagogical concerns. In
142 lesson study, it is important for mentors to consider what constitutes feedback and mentorship,
143 and how to provide feedback, when to offer, and what to target (Mandermach, Gonzales, and
144 Garrett, 2006). Post lesson study discussion, for example, allows both the mentors and mentees
145 to exchange feedback and responses to refine instruction. In this process, the mentors' sharing
146 with their mentees the purpose and rationale of the feedback is critical.

147 Creating an open, trustful environment is essential for successful lesson study to provide in-depth
148 reflection opportunities (Gilbert, Schiff, and Cunliffe 2013). This can be accomplished with an
149 effective facilitator. Adult learners are self-reliant and self-directed, but their participation in
150 lesson study may be constructed as dependent learners (Fidishun, 2012). Adult learners, such as
151 teachers, need to define the intended outcome of the lesson study that helps them discover their
152 desirable lessons and develop new pedagogical skills and knowledge (Nichols, 1994). In essence,
153 the physical features of the lesson study are important factors in creating an open, trusting
154 environment suitable for deep reflection and sensitive interpersonal communication (Gilbert,
155 Schiff, and Cunliffe 2013). Andragogy is based on premise that shaping teachers into self-
156 directed learners who take responsibility for their own growth depends on the facilitator
157 (Fidishun, 2012). Additionally in the conceptions of andragogy (Knowles, 1989), teachers are
158 situated in problem-centered learning that focuses on creating a climate to help them seek

159 profound levels of self-reflection about their teaching. In this conceptual approach, teachers are
160 tasked with learning PE content and instruction while reflecting on how their lesson study
161 benefits them (Sato and Haegele, 2017). The goal is not to find a single correct answer. Instead,
162 the objective is for the teachers to find as many various solutions to the challenge as possible
163 (Mosston and Ashworth, 1994; Nichols, 1994). During lesson study sessions, the conceptions of
164 andragogy support the elements of the demonstration, observation, discussion, and evaluation
165 regarding (a) what teachers expect to learn, (b) how they might use it in practice, and (c) how
166 lesson study will help them to meet the goals of their learning plans (Fidishun, 2012).

167 The purpose of this study was to investigate Japanese elementary teachers' professional
168 development (lesson study) experiences using the conceptions of andragogy in physical
169 education (PE) in a metropolitan school district. The research questions that guided the study
170 were: (a) What are Japanese teachers' experiences of lesson study in relation to teaching PE to
171 elementary school children? (b) How do lesson study experiences mediate Japanese teachers'
172 perspectives on teaching PE to elementary school children?

173 **Method**

174 The research method involved a descriptive-qualitative approach using in-depth, semi-
175 structured interviews (Seidman, 1998). The aim of the interviewing method was to solicit
176 teachers' perspectives about their PD experiences and to unpack the meaning they ascribed to
177 those experiences. Unquestionably, interviewing is a powerful way to gain insight into the
178 educational and social phenomena experienced by individuals in educational contexts (Seidman,
179 1998). Interviews are unique as they allow the researcher "to acquire data not obtainable in any
180 other way" (Gay, 1996, p. 223). Examples include a teacher's past experiences with their
181 students and reflection and recall of past lesson study inside or outside of the present study. From
182 an insider's viewpoints, the lead author conducted a series of semi-structured interviews with six

183 participants involved in the lesson study process. As supplemental data, the conversations of
184 mentors during the observation of lesson study and the dialogues of the participants during the
185 post-lesson study discussion session were also analyzed. We sought to uncover the participants'
186 interpretations of their lesson study and mentoring experiences as PE professionals.

187 *Research Site*

188 The research site was Toyama Elementary School (pseudonym) located in a metropolitan city
189 in Chiba Prefecture, Japan. During the conduct of this study, some 600 children were enrolled in
190 the school, and a total of 33,506 elementary children in the school district. The school district has
191 a high proportion of middle-class families, with an annual average household income of 3.83
192 million yen (about \$36,000 US dollars). In the last five years, many teachers have retired from this
193 school district, and so there were many novice teachers (less than five years of teaching
194 experience) between the ages of 23 and 27. Two teachers who participated in this study, Mr. Ishige
195 and Mr. Hayashi (pseudonyms), were regarded as two of the few senior teachers (age 30 to 34,
196 with more than 5 years teaching experience) in Toyama Elementary School currently.

197 *Participants*

198 Six participants were selected from Toyama Elementary School. The lead researcher
199 contacted the school district to request nominations of teachers who matched the following
200 criteria: (a) certified to teach all academic subjects in elementary school and (b) certified to teach
201 PE in secondary school. As previously indicated, elementary school teachers are not specialized
202 in a certain subject area in Japan, but it is common for elementary teachers to also obtain a
203 subject-specific secondary school license. Four teachers were selected based on the three criteria
204 (Mr. Ishige, Mr. Hayashi, Ms. Yamaguchi, and Ms. Amami). Pseudonyms were assigned to all

205 participants to ensure anonymity and protect identity. Table 1 provides further descriptive
206 information about each participant.

207 *****PLEASE INSERT TABLE 1 HERE*****

208 Ms. Yamaguchi and Ms. Amami were the lesson study presenters. Ms. Yamaguchi (3rd grade
209 teacher) had four years of experience and Ms. Amami (5th grade teacher) had five years of
210 teaching experiences at Toyama Elementary School. Toyama Elementary school was the first
211 school site they were assigned to work at by the Department of Education in Chiba prefecture.
212 Ms. Yamauchi and Ms. Amami had faced *Gakkyu Hokai* (classroom chaos) which means a
213 teacher loses control over the students; for instance, students walk around the classroom or keep
214 speaking during lessons, and a teacher cannot establish a stable teaching-learning environment
215 (Katsuno, 2016). *Gakkyu Hokai* has become an increasingly serious problem in the last few
216 decades arguably due to *Yutori* education policy (1998-2011), which reduced thirty percent of
217 the hours and content of the curriculum in elementary education. According to Kariya (2010) and
218 MEXT (2008), since this educational reform, academic achievement in Japan has declined
219 (Ainsworth, 2013).

220 Mr. Ishige mentored Ms. Yamaguchi and Ms. Amami, and Mr. Hayashi was responsible for
221 coordinating all PE PD workshops and events. The school principal, Mr. Saito, and a school
222 district PE coordinator who observed lesson study presentations, Mr. Onishi, were also recruited.
223 The teaching experience of the four classroom teachers ranged from 2 to 14 years, and Mr. Ishige
224 and Mr. Hayashi had 1–2 years of experience as a PE director. Mr. Saito and Mr. Onishi had
225 more than 20 years of teaching experience. None of the teachers had taken PE pedagogy courses
226 during their teacher training programs, as no such courses are offered in any programs at present,

227 although secondary PE-related coursework is offered at all teacher licensure programs in
228 universities in Japan (MEXT, 2018).

229 **Data Collection**

230 The Institutional Review Board (IRB) of the lead author's university approved the study. The
231 primary data source was face-to-face interviews, and two other supplemental data including
232 observers' conversations during two lesson studies presented by Ms. Yamaguchi and Ms.
233 Amami, and post-lesson study discussions were also conducted and recorded, and later analyzed.

234 *Face-to-face interviews:* The main sources of data were audiotaped face-to-face interviews
235 using a two-phase approach (i.e. reflecting and responding) (Yin, 2003). In the reflection phase,
236 12 open-ended questions (translated from English to Japanese) were given to the lesson study
237 presenters (Ms. Yamaguchi and Ms. Amami), and a version of the interview questions on
238 mentorship were posed to Mr. Ishige, Mr. Hayashi, Mr. Onishi, and Mr. Saito. The lead
239 researcher asked participants about their lesson study experiences at Toyama Elementary School.
240 The questions were constructed according to conceptions of andragogy (Knowles, 1989). While
241 some questions were asked to all participants, some questions were directed only to specific
242 participants since their roles were different (e.g. mentors and mentees) in lesson studies.
243 Examples of interview questions included (a) In what ways, could lesson studies serve your
244 education needs and solve issues and concerns that you are facing in teaching elementary
245 students in PE? (b) What did you hope to gain from mentoring of lesson study and post-
246 discussion conferences? (Ms. Yamaguchi and Ms. Amami) (c) What are the important factors
247 that determine the quality of lesson study and post-discussion conferences? (d) How do you
248 improve your mentoring skills? (Mr. Ishige, Mr. Hayashi, Mr. Monishi, and Mr. Saito).

249 In the responding phase, each teacher answered questions in an informal conversational style.
250 While the interview guide ensured consistency of interview questions asked in the reflecting

251 phase and responding phases, the data collector skillfully probed beyond the pre-established
252 questions to ascertain the individual teachers' contextual realities. The teachers were interviewed
253 at the elementary school, with no interruptions. The individual interview sessions lasted 60 to 90
254 minutes. All interviews were audiotaped with the teachers' permission and then transcribed, and
255 the transcripts were then translated from Japanese to English. The lead author, a Japanese male
256 trained in case study and interviewing methods, served as a data collector and as an analyst for
257 this study. All data were collected over a two-month period.

258 *Two lesson studies presented by Ms. Yamaguchi and Ms. Amami and mentors' conversations.*
259 Both lesson studies were audiotaped with the teachers' permission and then transcribed. The lead
260 author also took digital photos of lesson study materials, although video recording was not
261 allowed. Ms. Yamaguchi's lesson study consisted of six stationary activities in a gymnastic floor
262 routine, including; 1. Rolling, 2. Head over Heels, 3. Forward and Backward roll, 4. Bridges, 5.
263 Levers and 6. Stands for her 35 third-grade children in a 45-minute lesson. Ms. Amami taught a
264 hurdle lesson that consisted of three parts: (a) hurdle drills, including rhythm drill (without
265 hurdle); (b) hurdle rhythm practices; and (c) skip over the hurdle routine for 30 fifth-grade
266 children in a 45-minute lesson. More than ten classroom teachers, as well as Mr. Ishige, Mr.
267 Hayashi, Mr. Saito, and Mr. Onishi, observed their lesson study presentations. Although it was a
268 challenge to control background noises and interruptions, all mentors' conversations during the
269 lesson studies were also audiotaped to be transcribed.

270 *Post-lesson study discussion.* A post-lesson discussion was held a few days after the lesson
271 study presentation to enable the teachers to reflect upon their instruction (e.g. children's
272 engagement, learning experiences, and teaching content). In the post-lesson discussion,
273 development of the spectrum of teaching styles (Mosston and Ashworth, 1994) was used to

274 analyze the lesson study presentations provided by Ms. Yamaguchi and Ms. Amami. The focus
275 of the post-lesson discussion was to discuss student learning in all three domains including
276 cognitive, social, and psychomotor components. During the discussion, all observers of the
277 lesson study presentations including the classroom teachers, mentor, directors of PE at the
278 school, school principal, and director of PE in the school district referred to their observation
279 notes to talk about the presentations. With the teachers' permission, all discussions were
280 audiotaped and transcribed.

281 *Translation process.* The four native Japanese translators (A [data collector], B, C, and D)
282 were bilingual faculty members in PE departments at universities in the United States (US) and
283 Japan. This study used the cross-cultural translation technique developed by Banville,
284 Desrosiers, and Genet-Volet (2000), which has been used previously with Japanese teachers by
285 Hodge, Sato, Mukoyama, and Kozub (2013). All translators were fluent in both English and
286 Japanese. First, three translators (A, B, and C) individually translated the original Japanese
287 version of the interview data into English. Later, they compared their versions and discussed any
288 differences to arrive at an agreement. They then edited the translated data as deemed necessary
289 for proper vocabulary, grammar, and syntax. The Japanese and English versions were sent to a
290 bilingual faculty member (Translator D) in the U.S., who translated the interview data into
291 English. In the second step, a committee consisting of the four bilingual translators and an
292 established PE faculty member were asked to critique (evaluate) the interview data. The
293 committee recommended edits to the interview data to ensure that the meaning of the English
294 and the original items was the same. Agreement was reached on all items on the interview data.

295 *Data analysis.* A hybrid approach of thematic analysis (qualitative method) (Fereday and
296 Muir-Cochrane, 2006) was used to explore, describe, and interpret the data, which allowed

297 themes to emerge from the conceptional framework. The first step in this analytical process is to
298 identify the storyline. The storyline is the primary message that the analyst interprets as what the
299 interviewee is trying to convey. The second step is to identify the implicit and explicit aspects of
300 the participants' story (i.e., interview responses). Oftentimes, what participants share during the
301 interview has explicit and implicit meanings, and those two dimensions typically involve both
302 negative and positive sides (i.e. oppositions). The main oppositions associated with this story
303 include right and wrong reasons (e.g. political, structural, and pedagogical reasons). The
304 storyteller is clear that there are right and wrong reasons or an important moment to engage in
305 PD and thus, finding oppositions allows researchers to uncover the meaning of key factors of the
306 discourse by analyzing what the narratives imply (Boyatzis, 1998).

307 The last step is identifying and presenting an argument in an inferential, logical form. This
308 argument led us to reproduce the story in the form of syllogisms, logical arguments that helped
309 the interviewee(s) express the ideas. More specifically, each potentially meaningful piece of data
310 within the transcripts from the first set of interviews with each participant was coded
311 independently by the first and second authors, and the differences were discussed until
312 agreement was reached. The second set of interviews was initially coded by the lead author and
313 then checked by the second author. In addition, two peer debriefers reviewed the codes to avoid
314 potential researcher bias. The researchers grouped the codes into thematic categories, which were
315 then refined into recurring themes.

316 Drawing on conceptions of andragogy, this study devised a template (see Table 2) as an
317 organizing text for interpretation of data generated with participants (Crabtree and Miller, 1999).
318 In the form of thematic coding through thematic analysis, the researchers searched for key or
319 meaningful phrases or words that expose the characteristics of adult learners. More specifically,

320 through a process of data analysis and interpretation through andragogy conceptions, the
321 researchers reached a consensus about categorizing phrases and quotes. Table 2 illustrates
322 examples (Ms. Yamaguchi and Mr. Hayashi) of how conceptual categories and themes are
323 intertwined, and the number of narrative phases addressing those results.

324 ******PLEASE INSERT TABLE 2 HERE******

325 *Trustworthiness.* Trustworthiness was established through triangulation, member checking,
326 and peer debriefing. Triangulation involved the use of multiple data sources, including those
327 from interview transcripts and email messages. Member checking was used to reduce the impact
328 of subjective bias (Patton, 2002). The researcher sent electronic files of the interview transcripts
329 and emergent themes to the respective participants. The participants' acknowledgment of the
330 accuracy of the transcripts and the researchers' interpretations of the data ensured that
331 trustworthiness was established. Peer debriefing is a process of exposing oneself to a
332 knowledgeable peer in a manner paralleling an analytic session, with the aim of exploring
333 aspects of the inquiry that might remain only implicit in the inquirer's mind (Patton, 2002). For
334 this study, two professional colleagues with expertise in qualitative research agreed to serve as
335 peer debriefers. These individuals reviewed the established themes and agreed with the findings
336 of the researchers. They deemed the interpretations of the data to be accurate and representative.

337 **Results and Discussion**

338 The purpose of this study was to investigate Japanese elementary teachers' PD (lesson study)
339 experiences using the conceptions of andragogy in PE lesson study at a metropolitan school
340 district in Japan. Three major interrelated and complex themes emerged from the data analyses:
341 (a) *challenges*, (b) *vitalness of a mentor's role*, and (c) *self-directed learner*. These themes
342 illustrate the participants' experiences during and after lesson study presentations.

343 **Theme I: Challenges**

344 This theme demonstrates that Ms. Amami and Yamaguchi (two beginning teachers) struggled
345 to evaluate students' engagement and learning outcomes. More specifically, during the two
346 lesson study presentations observed by the principal (Mr. Saito), the school coordinator (Mr.
347 Onishi), and two mentors (Mr. Hayashi and Mr. Ishige), Ms. Amami and Ms. Yamaguchi
348 appeared to be challenged in their attempts, or failure, to capture students' feelings and reactions,
349 establish the learning environment for the students to feel secure in the lessons (Butler, 2015;
350 Sato, Miller, and Delk, 2018).

351 Both teachers tried to make their lessons interesting, but the observers detected that their
352 students demonstrated passive or apathetic attitudes toward the lessons. This is called dissonance
353 phenomena, which describes when an adult learners' existing pedagogical knowledge is
354 challenged in the teaching setting, and finds it to be incomplete (Knowles, 1984; Taylor and
355 Hamdy, 2013). For example, Mr. Saito, Mr. Onishi, and Mr. Hayashi commented as follows
356 about Ms. Amami's hurdle lesson:

357 We told all teachers that they need to make sure that students enjoy the lesson and establish
358 harmonious relationships with their students before concerning about teaching motor skills. Ms.
359 Amami did not pay sufficient attention toward students and focuses on teaching motor skills, so that
360 her students began to disengage in the lessons (because students feel that the teacher does not care
361 about them) (Mr. Saito, observation conversation).

362
363 I agree with you Mr. Saito. I also find that teachers may not quite understand what students'
364 engagement and their feelings mean. I am saying this, because some students are enjoying activities
365 that goes over and under different heights of hurdles. Look!! They want to do more, but Ms. Amami
366 stopped the activity. It seems students are upset. Mr. Hayashi... Can you bring this issue in the post
367 lesson study discussion? (Mr. Onishi, observation conversation)

368
369 Yes. I can do that, Mr. Onishi. I will add this to a new agenda of post-lesson discussion. I think Mr.
370 Ishige and I need to discuss about how to mentor teachers regarding this issue. We know that Ms.
371 Amami was a sprint athlete of 100 m hurdle, but it seems that teaching children is different with her
372 athletic experiences (Mr. Hayashi, observation conversation).

373
374 Scott and Ytreberg (1990) stated that security is vital to maximizing the outcome of students'
375 engagement and learning, and being able to provide supportive learning environments are

376 essential skills for qualified educators (Butler, 2015). During the lesson, Ms. Amami focused on
377 the self-fulfillment that comes from pressure to complete her lesson content within the timeframe
378 (Rothmann and Hamukangandu, 2013). Instead, she needs to alter this attempt to provide
379 successful and enjoyable experiences to her students, which would improve her teaching
380 effectiveness (Chemetzky, 2014).

381 Regarding this issue, Ms. Amami explained her reflections during the post-lesson study
382 discussion session in the interview that she realized the importance of developing relationships
383 with student (Chametzky, 2014):

384 I underestimated the challenges of effectively teaching hurdling skills to elementary children. I was
385 the athlete for a long time. I know how to run and jump faster, but I learned that teaching is different
386 from coaching. Based on the feedback from Mr. Ishige, Mr. Onishi, and Mr. Hayashi, I felt that the
387 fact that I designed a discipline-based lesson caused many problems. I have a hard time capturing
388 children's facial expression and feelings during my lessons on what they like and what they don't like
389 to do. Mr. Ishige suggested me to focus on students' reactions during the lesson. Also, Mr. Ishige told
390 me to make tasks more developmentally appropriate. For example, he recommended me using music
391 and rhythmic activities to enhance children's hurdling skills for this developmental level (Ms.
392 Amami, individual interview).

393
394 Ms. Amami recognized her lack of attention to students' responses to her instruction due to her
395 insufficient knowledge of student development. Any less authentic approach tends to drift
396 toward teacher-centeredness, which potentially creates an authoritative class environment
397 (Knowles, 1984). Ms. Amami's comments indicated that the discussion session facilitated her
398 conceptual transition from subject-centered teaching to performance-centered teaching, that is
399 passive knowledge of pre-existing ideas to active knowledge of how to produce ideas about how
400 to teach (Knowles, 1980).

401 During the interview, Mr. Saito, the principal, mentioned a larger issue that many elementary
402 teachers face in the school district relative to the issues of teachers' skill in developing the
403 learning environment:

404 This school district has many beginning teachers like Ms. Yamaguchi and Ms. Amami. More than 80
405 percent of teachers are beginning teachers. Many teachers only have less than 5 years of teaching
406 experiences. Mr. Hayashi and Mr. Ishige have 8-10 years of teaching experiences. They were
407 considered as senior and teaching expert in this school district. (As a school district with many
408 beginning teachers,) Classroom Chaos (*Gakkyu-hokai*) has been a serious issue. Children ignored
409 their teachers and act up, walk out, and run amok, even destroy academic and classroom supplies (Mr.
410 Saito, interview).

411
412 The inclusion of professional development, such as lesson study, is important in minimizing
413 classroom chaos, which is often experienced by beginning teachers. Mr. Saito hopes to see
414 current elementary classroom teachers continue to motivate themselves to engage in PD
415 opportunities, such as a lesson study, so as to become effective teachers.

416 **Theme II: Vitalness of a mentor's role**

417 The theme 'vitalness of a mentor's role' captures the teachers' beliefs that the role mentors
418 play are imperative to the success of lesson study. Four participants—Mr. Hayashi, Mr. Ishige,
419 Ms. Amami, and Ms. Yamaguchi—are classroom teachers who are responsible for a different
420 class at various grade levels each year (Okumura, 2017). These participants were comfortable
421 teaching other academic subjects such as reading, math, and/or science in their classrooms.
422 Although they had difficulty in teaching elementary PE, the teachers believed the lesson study
423 mentoring system is beneficial in providing and receiving individual feedback. They also
424 recognized that mentoring is vital because their students' population was unique in a way that
425 many children in the district engage in sport and physical activities more than children in
426 different school districts. In such an area, there is a larger gap in psychomotor development
427 between children who are athletes and their peers who are not athletes (Abiko, 2007). Ms.
428 Yamaguchi explained that,

429 I think I needed to have my self-reflective views of my teaching, because I need to share my teaching
430 experiences with other classroom teachers. Lesson study is the only opportunity that I can find my
431 invisible or unnoticed issues in my teaching. Plus, lesson study helps me to become physical
432 education specialist not generalist. Mr. Ishige, and Mr. Hayashi helped my teaching significantly.
433 (Ms. Yamaguchi, interviews).

434

435 Her comments indicated that the lesson study assisted her development of expertise in PE,
436 adapting to various learning styles, and an ability to understand new perspectives on children's
437 cognitive and physical development (Okumura, 2017).

438 For the new teachers, learning from experienced teachers (who understand what their
439 students think, do, and achieve and make effective professional judgement) was beneficial,
440 because they were assigned to a different class each year. For instance, Ms. Yamaguchi, taught
441 three different grade levels. These teachers have limited opportunities to accumulate knowledge
442 of students in different grade levels compared with other countries, such as the U.S., where
443 teachers are licensed from K-12, although Japanese teachers can gain a deep understanding of
444 individual students' backgrounds, personalities, characteristics, and behaviors in their assigned
445 classrooms. Japanese teachers also need to gain specialized pedagogical knowledge and skills
446 after graduating from teacher education programs, because they do not have sufficient training
447 when they are pre-service PE teachers. According to the conceptions of andragogy (Knowles,
448 1989), the process of learning new things (e.g. specialized knowledge in PE) is not just about
449 acquiring knowledge (surface level of learning). It includes being able to comprehend and apply
450 it in their own instruction. Therefore, all teachers must be continuously seeking how and where
451 their process of learning fits into the professional environment (Wenger, 1998).

452 Both Ms. Yamaguchi and Ms. Amami felt that their colleagues, Mr. Hayashi and Mr.
453 Ishige, demonstrated expertise in PE because both had strong content, pedagogical, and cultural
454 knowledge, as well as access to recent research findings about PE lesson studies and theoretical
455 knowledge that are difficult to access on their own (Fernandez, 2002). The most effective self-
456 directed mentors encourage reflection on action, highlight areas of strength and weakness of

457 lesson studies, and share resources (e.g. printed materials, audiovisual aids, and every other kind
458 of resource) to children, teachers, and other staff (Knowles, 1984).

459 From a mentor perspective, Mr. Ishige said:

460 As being a mentor of Ms. Yamaguchi and Ms. Amami, I learned the skills to provide feedback and
461 mentoring. They do not have time to find resources for their teaching improvement. Based on
462 observing their lesson study presentations, I was thinking how to select beneficial resources for Ms.
463 Yamaguchi and Ms. Amami to meet their individual needs. These teachers have different learning
464 styles. Ms. Yamaguchi tends to increase her confidence when I give step by step feedback for each
465 element of the lesson, such as warm-up, the body of lesson, and closure. On the other hand, Ms.
466 Amami improved her teaching competence through struggles that she confronts (Mr. Ishige,
467 interviews).

468
469 For Mr. Ishige, these mentoring experiences were eye-opening. As a mentor, he collaboratively
470 examined what resources were valuable for his mentees and helped them maximize their learning
471 through their lesson study presentations (Fernandez, 2002). In the collective culture of Toyama
472 Elementary School, teachers searched for common core values and the goals of lesson study as a
473 team (Collinson and Ono, 2001). The collaborative culture of PD in lesson study groups occurs
474 in the moment of social and professional interaction. This also contextually tied together for
475 interactions involving relevant PD activities (Kayi-Aydar, 2014).

476 Mr. Hayashi explained that Ms. Yamaguchi and Ms. Amami needed to find strategies to
477 enhance the elusive nuances (providing details of proper teaching cues and subtle differences
478 among age groups) of PE specialized learning. He said that:

479 I need to facilitate lesson study learning opportunities for all elementary teachers to allow them to
480 gain PE specialized knowledge and skills. This is extremely important, because, for example, Ms.
481 Yamaguchi and Ms. Amami are teaching PE to their children throughout this academic year. They do
482 not teach other classroom children. They spent three years here, this means that they only teach two to
483 three different grade children. This means that they only had teaching experiences with 90 to 100
484 children within three years. If they are specialized to teach PE, they may need to teach all children in
485 this elementary school. We are generalists, this is why we need lesson study and enhance our teaching
486 and learning (Mr. Hayashi).

487
488 Mr. Hayashi also stated that lesson study enhanced teachers to use authentic pedagogical

489 approaches. Since all teachers need to teach all subject areas, instead of making those teachers

490 PE specialists, lesson study attempts to help them become general educators who understand
491 various teaching styles (e.g. command, practice, reciprocal, self-check, and guided-discovery) to
492 implement PE lessons effectively. Rink and Hall (2008) asserted that effective and specialized
493 PE teachers must have not only a clear vision of the developmentally appropriate repertoire of
494 motor and social skills that all students should learn, they must also devise lesson structures that
495 allow no students to be left behind. In the conceptions of andragogy, the influence of lesson
496 study should promote teachers' and students' growth and change as well as their learning
497 experiences in the real world (Mezirow, 2000). Mr. Hayashi believed that as a PE director, he
498 needed to facilitate all teachers' learning with an acute evaluation of their teaching through
499 lesson study presentations and assist them in integrating specialized knowledge and practices.
500 This represents using problem-solving strategies through experiential learning.

501 **Theme III: Self-directed learner**

502 The theme *self-directed learner* captures the importance of reflective self-directed learning.
503 The two lesson study presenters, Ms. Yamaguchi and Ms. Amami, attended a post-lesson study
504 discussion meeting with the observers (Mr. Hayashi, Mr. Ishige, Mr. Onishi, and Mr. Saito). The
505 purpose of this session was to identify the skills that need to be improved to enhance their
506 teaching effectiveness (Siedentop, 1981). In the interviews, for example, Ms. Amami and Ms.
507 Yamaguchi reflected and described themselves as instructional leaders in the PE classes. They
508 recognized the need to develop reciprocal relationships with students; they often use command
509 (teachers make all of instructional decisions and inputs for students) and practice (teachers
510 determine what is taught and introduce skills and tasks) teaching styles that are the most
511 common teaching strategies used in PE. However, they had difficulty in using reciprocal styles
512 that allocate students responsibility for the learning of other students and develop their

513 communication skills, promote patience, and motor skill analysis (Nichols, 1994). Additionally,
514 they identified the need to reformulate instructional objectives, investigate resource materials,
515 and evaluate learning outcomes (Knowles, 1975). During, the post lesson study discussion
516 session, Mr. Hayashi, Mr. Ishige, Mr. Onishi, and Mr. Saito also served as stimuli to assist
517 teachers' further self-directed learning (Knowles, 1975) for the discovery of connections
518 between teachers' own learning objectives and the solutions to teaching students PE
519 (Chametzky, 2014).

520 In the post-lesson study discussion, written lesson study reports were circulated by Mr.
521 Hayashi, who served as the moderator of the session. One of the important topics addressed in
522 this meeting was "how classroom teachers evaluate achievement of targeted learning goals." Mr.
523 Hayashi commented to everyone in the meeting that:

524 Overall, the lesson reports written by Ms. Yamaguchi and Ms. Amami were well described and I
525 found both of you spent tremendous amount of time for the lesson study preparation. Today's
526 discussion, we should focus on how we (classroom teachers) measure students' achievement toward
527 targeted learning outcomes. This is an assessment question. In this group, many teachers also struggle
528 to develop knowledge building efforts (Mr. Hayashi, post-lesson study discussion).

529
530 As a presenter, Ms. Amami explained that

531 I think this is an important question, but I am not confident to say that I know the answers of the
532 questions. Based on my background, I was the athlete of hurdling, but I did not spend sufficient time
533 to identify what elementary children need to progress. I never imagined. Therefore, I think there are
534 gaps between targeted learning goals and students' achievement. I would like to hear responses from
535 classroom teachers today (Ms. Amami, post-lesson study discussion).

536
537 Mr. Ishige, an observer, responded that

538
539 My recommendation is that Ms. Amami needs small scale evaluation that tests developmentally
540 appropriate relevancy in PE. Probably, she knows hurdling skills, but not for elementary students. I
541 encourage her to analyze to distinguish whether changes and evaluation were an improvement to
542 determine the next variation to assessment. For example, Ms. Amami can use movement of sequence
543 aligning with short term objectives (Mr. Ishige, post-lesson study discussion).

544
545 Although Ms. Amami did not have an answer to the question asked by Mr. Hayashi, she was
546 able to acquire specific ideas from Mr. Ishige. In the conceptions of andragogy, teachers need to

547 develop evaluation systems that measure students' expected competency and outcomes including
548 what to measure, how, when, by whom (Knowles et al., 2005). The post-lesson discussion helped
549 Ms. Amami and Ms. Yamaguchi develop and consolidate their knowledge and skills relative to
550 this challenge in assessment (Taylor and Hamdy, 2013). The session was successful in providing
551 the opportunity for teachers to deeply discuss the issues observed during the lesson study
552 presentation, which allowed them to reflect on their teaching with specific examples while
553 mentors provided suggestions (Knowles, 1995).

554 The school coordinator, Mr. Saito, explained that post-lesson study discussion meetings are
555 important because this type of meeting provides an opportunity to disseminate critical knowledge
556 (Fernandez, 2002). Through the discussion about Ms. Amami's instructional change, Ms.
557 Yamaguchi was also able to reflect upon her own teaching and plan specific steps to enhance her
558 teaching competence. Mr. Ishige's recommendation facilitated Ms. Amami to identify her
559 instructional issues and self-directed learning. Ms. Amami promised to share her future plans
560 with Mr. Ishige. She commented that:

561 From tomorrow, I will create one page relevant and developmentally appropriate assessment of
562 gymnastics floor routine for 3rd graders. Also, I think I focused skills and techniques too much. I did
563 not care about my children's motivation. I think it is important to find good practices of gymnastics
564 routine. From post-lesson study meetings, I learned that athletic experiences may adversely affect to
565 teaching children, because we may ignore children's developmental growth and learning progress. I
566 realized from this meeting (Ms. Yamaguchi, interview).
567

568 This comment illustrates that feedback is key to developing cognitive understanding, motivation,
569 engagement, and interpersonal connections (Ryan and Deci, 2000; Mandermach et al., 2006).

570 Self-directed learning in andragogy conceptions is a process of becoming an independent learner
571 that primarily takes place outside of the lesson study, whereby teachers make decisions and
572 become responsible for their own learning process by determining their needs, setting goals,
573 identifying resources, implementing a plan to meet their goals, and evaluating the outcomes

574 (Knowles, 1980; 1984; 1995; Song and Hill, 2007). It has previously been demonstrated that
575 teachers in PD seek “possible selves,” meaning they try to find ideal versions of themselves
576 (Markus and Nurius, 1986). Moreover, the discussion session provided a place where a principal,
577 a PE coordinator, and a teacher could share their ideas and move toward common educational
578 goals, objectives, and values.

579 Finally, Mr. Onishi mentioned the training of future leaders in elementary PE;

580 I really do hope that these young teachers such as Ms. Yamaguchi and Ms. Amami become
581 independent learners and future leaders of PE. I think mentoring helped Ms. Yamaguchi and Ms.
582 Amami plan, teach, assess, and evaluate lesson studies. This is why post discussion meetings were
583 important (Mr. Onishi, interview).

584
585 Mr. Onishi believed that the lesson study assists teachers in becoming transformational learners
586 and it empowers all teachers while nurturing them through a change in PE (Northouse, 2003). He
587 also mentioned that “this lesson study is not only for Ms. Yamaguchi and Ms. Amami but also
588 for Mr. Hayashi and Mr. Ishige, because all teachers including myself and Mr. Saito are also
589 evaluating their mentoring skills.” Mr. Onishi also said that he is “still learning about mentoring
590 Mr. Ishige and Mr. Hayashi to demonstrate constructive, informative, and useful feedback, rather
591 than giving simple feedback” (hands-on or suggestions). Mr. Hayashi and Mr. Ishige also need to
592 reflect on their own feedback and check what mentees are learning (Song and Hill, 2007).

593 Knowles (1975) explained that teachers should consider how to best become transformational
594 adult learners who serve as visionary role models that demonstrate moral values and problem-
595 solving skills while simultaneously listening to and trusting in teachers and children. The post-
596 lesson study discussion session appears to be beneficial not only for the lesson study presenters,
597 but also for mentors to reflect on how they can become more effective. This discussion session
598 stimulated the participants to engage in self-reflected learning.

599 **Study limitations**

600 This study has four major limitations. First, the participants were selected from one
601 elementary school in Japan. Having more than one elementary school would have enabled a
602 cross-case analysis which could extend the investigators' expertise beyond the single case
603 (Stretton, 1969). Cross-case analysis also provides researchers opportunities to learn from
604 different cases and gather critical evidence to modify a specific event (Eckstein, 2002).

605 Second, the number of participants was small, and they had rather diverse backgrounds and
606 experiences. This allowed us to acquire different perspectives from teachers who had different
607 roles, including a principal, a lesson study coordinator, mentors, and lesson study presenters.
608 However, we had only one or two participants for each role. More participants for each role
609 would enable us to understand the unique experiences of teachers in different roles.
610 Nevertheless, qualitative inquiries, including case studies, typically use small samples, and in the
611 logic of criterion sampling, the intent is to capture and describe the central themes that represent
612 the phenomena under study for a particular cohort of interest (Patton, 2002). Our aim in using
613 this sampling approach was to uncover themes in lesson study experiences.

614 Third, there were no vice principals involved in this study, as the teachers did not work in
615 one-on-one contexts with a vice principal. This is a limitation, because vice principals in
616 Japanese elementary schools typically understand individual teachers in the school very well and
617 have strong connections with parents. Interviewing a vice principal might provide a unique
618 perspective for understanding lesson study phenomena.

619 Lastly, the researchers did not interview school-age students from the teachers' classes to
620 explore their reflections and perspectives about the lessons. While the participants discussed
621 student behaviors, interests, and motivations, there was no direct information from students.

622 Obtaining students' perspectives could further facilitate understanding the phenomena of lesson
623 study, and thus, researchers in the future should consider examining students' voices.

624 **Recommendations and Conclusions**

625 The results of this study demonstrated that teachers in different roles had meaningful
626 experiences through the lesson study and post-lesson study discussion meetings. The following
627 recommendations are intended to enhance the quality of lesson study experiences for teachers.
628 First, the findings emphasized the importance of the reflective cycle for teacher development
629 (Lewis, Perry, and Hurd, 2009) regardless of the use of lesson study. Close analyses of their own
630 teaching with expert guidance are the keys for adult learners to improve themselves to meet their
631 targeted goals (Lewis, Perry, and Hurd, 2009).

632 Second, it is important to understand that when applying the lesson study model from one
633 country to another, the relevant Ministry of Education or school districts must make changes to
634 adapt the lesson study contexts and purpose of current teachers' PD in physical education
635 (Halpin and Troyna, 1995). They need to investigate how teachers in other countries improve
636 their knowledge building process and practices of teaching in PE through lesson study
637 (Grimsæth and Oddrun Halla's, 2016).

638 Third, because teachers struggled with understanding students' developmental levels and
639 students' reactions to their lesson, teachers need to shift their attention to children's thinking and
640 learning when using lesson study. When they plan, teachers need to do so through the children's
641 lens (Fernandez, Cannon, and Chokshi, 2003) and identify indicators of children's engagement.
642 In the lesson study or even other forms of PD, teachers should focus on children's interests,
643 engagement, and performance to enhance teachers' instructional effectiveness (Lenski and
644 Caskey, 2009).

645 Fourth, school districts might need to establish lesson study PD programs focused on student
646 learning outcomes. This type of program could provide a benchmark for administrators in all
647 elementary schools to evaluate the quality of a mentoring program and lesson study supervision
648 protocols (Tsuda, Sato, Wyant, and Hasegawa, 2019). School districts should develop a program
649 and process for lesson study mentoring to take place (Inzer and Carwford, 2005). The mentoring
650 portion plays a significant role in creating positive outcomes, because mentors and mentees are
651 in collaborative relationships. School districts could develop formal and informal assessment
652 plans of lesson plan development with mentoring materials to demonstrate how to implement
653 mentoring programs between junior and senior classroom teachers.

654 Fifth, teachers and school districts must share a common understanding and vision of lesson
655 study, and it is necessary to move from discussions to actually engaging in lesson study (Chokshi
656 and Fernandez, 2004). As with other innovative approaches, it might be best to begin lesson
657 study with a small, interested group of teachers. These teachers could develop a learning
658 community and adopt the lesson study approach with other elementary schools. The group can
659 set realistic expectations for implementing lesson study in their school.

660 The lesson study approach in PE is a way for teachers to engage in PD leading to activities
661 that promote instructional change. To implement these changes, there remains a need to heighten
662 awareness among teachers, administrators, and researchers to ensure that attention is directed to
663 children’s learning outcomes. We hope the teachers build capacity, expertise, and knowledge to
664 improve teaching and learning in a spectrum of PD in physical education.

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2 **Table 1: Demographic Information**

Name	Age	Degree	Lesson study Role	License	Position	Mentor Experiences
Ms. Yamaguchi	26	Bachelor	Lesson study presenter	Elementary teaching credential and Secondary PE	3 rd grade	No
Ms. Amami	27	Bachelor	Lesson study presenter	Elementary teaching credential and Secondary PE	5 th grade	No
Mr. Ishige	32	Bachelor	Mentor	Elementary teaching credential and Secondary PE	5 th grade	Yes
Mr. Hayashi	30	Bachelor	Physical Education Director	Elementary teaching credential and Secondary PE	6 th grade	Yes
Mr. Onishi	45	Bachelor	Supervisor	Elementary teaching credential and Secondary PE	School District PE coordinator	Yes
Mr. Saito	62	Master of Education	Evaluator	Elementary teaching credential and Secondary PE	Principal	Yes

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15 **Table 2: Data Analysis and Theoretical Category Example**

Theoretical Categories Example	Themes	Number of narrative phrases
Ms. Yamaguchi		
Face to Face Interviews Self-Directed Learning	<ul style="list-style-type: none"> • Highly Motivated Independent Learning Behaviors 	8
Problem centered	<ul style="list-style-type: none"> • Help seeking feedback and mentorship from Mr. Hayashi and Mr. Ishige 	9
Content centered	<ul style="list-style-type: none"> • Teacher centered instructions and lessons 	7
Lesson Study (observation only) Content centered	<ul style="list-style-type: none"> • Feeling of insecurity and discomfort 	N/A
Experiences	<ul style="list-style-type: none"> • Lack of time and behavioral management skills 	N/A
Post discussion interviews Self-evaluation	<ul style="list-style-type: none"> • Help Seeking Behaviors 	5
Mr. Hayashi		
Face to Face Interviews Self-Directed Learning	<ul style="list-style-type: none"> • Highly Motivated for training future leaders and mentors 	8
Problem centered	<ul style="list-style-type: none"> • Effective feedback and mentorships 	9
Lesson Study (conversations with Mr. Onishi, Mr. Saito, and Mr. Ishige)	<ul style="list-style-type: none"> • Assessment and evaluation improvement of lesson studies 	5
Self-Directed Learning	<ul style="list-style-type: none"> • Comments about behavioral management skills 	6
Post discussion interviews Problem centered	<ul style="list-style-type: none"> • Recommendations about their lesson studies. • Motivate Ms. Amami and Yamaguchi do better. 	7
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