

1 “We Took Pictures”: Children’s Meaning-Making in Physical Education

2

### **Abstract**

Purpose: Studying learning in physical education in primary schools is complex and largely practical and embodied; not only involving the child, but is also closely linked to the lesson context. The aim of this paper is to understand teaching and learning in primary physical education through the use of photo diaries. Method: Participants were children (n=38) and their teachers (n=2) across a six-week period in two Irish primary schools. Data included children's photo-diaries, photo-elicitation focus group interviews with the children, and interviews with their teachers. Results: Results highlight that photo-diaries supported children's meaning-making processes about their learning, highlighting a variety of meanings grounded in the centrality of the body as performance of learning. Discussion/Conclusion: The value of photo-based approaches with primary school age children to access their meaning-making and influences on their understandings is highlighted.

### **Keywords**

Photo-voice, Student voice, Primary physical education

24 A central purpose of primary physical education curricula worldwide is to support  
25 children's learning towards a physically active lifestyle (Griggs & Petrie, 2018). If physical  
26 education is to be embraced by all and regarded as a site for inclusive, lifelong learning, then  
27 the meanings and values attached to movement by students are worthy of attention  
28 (O'Connor, 2018). Learning can be described as meaning-making resulting in a more  
29 developed and specific repertoire to act. In this way learning is "the acquisition of a complex  
30 set of predispositions to act. In this process, the world becomes more differentiated. It  
31 becomes, in other words, infused with meaning" (Biesta & Burbules, 2003, p. 37). Studying  
32 learning in general is complex (Quennerstedt, Öhman, & Öhman, 2011). Physical education  
33 learning in primary schools is exacerbated as it largely occurs through the medium of  
34 movement and is, to a great extent practical and embodied, not only involving the child, but  
35 also closely linked to the lesson context.

36 Learning outcomes in physical education relate to the physical, affective, and  
37 cognitive learning domains contributing to children's holistic development and equipping  
38 them with the skills, knowledge, and dispositions for lifelong physical activity involvement.  
39 To gain a clearer understanding of how and what children learn from teaching, how they  
40 perceive or give meaning to instructional events must first be examined as children's  
41 perceptions serve as the framework from which they interpret instruction and select learning  
42 strategies or cognitive processes to employ (Lee & Solmon, 1992)

43 From the limited data available, many young people, however, tend not to view  
44 physical education as a place to learn. Children's perceptions reflect their experiences and  
45 how physical education is taught highlighting the absence of explicit learning outcomes.  
46 Worldwide (Dyson, 2006; Jones & Cheetham, 2001; O'Sullivan; 2002; Smith & Parr, 2007)  
47 participation in physical education is perceived by pupils as a break from the rest of school  
48 life, an opportunity for non-serious non-academic socialising that is about fun and enjoyment.

49 While studies have largely focused on secondary physical education, these discourses are  
50 evident in the limited information on primary school children (O’Sullivan 2002), though  
51 when comparing physical activity and physical education, Parker, MacPhail, O’Sullivan, Ní  
52 Chróinín, and McEvoy (2018) found that children indicated physical education was for  
53 learning whereas physical activity was for fun.

54 Since Williams and Woodhouse noted two decades ago (1996) that young people’s  
55 views were “a neglected dimension of research into [PE] curriculum practice” (p. 212), there  
56 has been increasing interest in young people’s own ideas and understandings, of the ways  
57 they engage with physical activity and physical education (Azzarito, 2013; O’Sullivan &  
58 MacPhail, 2010). From a physical activity perspective, studies seeking young people’s views  
59 have investigated, among other things, the role and significance of physical activity in the  
60 lives of young people (e.g., Collier, MacPhail, & O’Sullivan, 2007), the views children assign  
61 to physical activity (Patton & Parker, 2013), and the relationship between physical education  
62 and physical activity (Parker et al., 2018). Within physical education studies have examined  
63 the negotiation and construction of physical education curricula (e.g., Enright & O’Sullivan,  
64 2010); physical education through children’s eyes (e.g., Dyson, 1995; Graham, 1995), and the  
65 value of instructional models for learning in physical education (e.g., Dyson, 2001; Hastie &  
66 Sinelnikov, 2006).

67 This literature, often through the use of visual methods, has positioned children as  
68 expert communicants of their own cultures, accurately capturing their voices as a reliable  
69 resource for understanding their formal and informal experiences (Thomson, 2008).  
70 Frequently young people have been asked to take photographs representing their experiences  
71 in the broader aspects of physical culture (e.g., Azzarito, 2012; Azzarito & Sterling, 2010;  
72 Patton & Parker, 2013). Few, however, have specifically addressed experiences in physical  
73 education (Enright & O’Sullivan, 2010; Oliver & Hamzeh, 2010; Treadwell & Stiehl, 2015)

74 and none, to our knowledge, have examined experiences in primary physical education. Thus  
75 while valuable evidence can be garnered from listening to children’s perspectives, with few  
76 exceptions, perspectives and experiences of primary physical education classes remain  
77 largely absent in the current physical education literature (Cope, Harvey & Kirk, 2014;  
78 Dyson, 1995; Graham, 1995; Parker et al., 2018).

79 Combining photographs with a journaling process provides an opportunity for  
80 participants to “show rather than ‘tell’ aspects of their identity that might have otherwise  
81 remained hidden” (Croghan, Griffin, Hunter, & Phoenix, 2008, p.345). Treadwell and Taylor  
82 (2017) found photographs helped students reflect on their physical activity behaviors and  
83 better understand issues related to their participation, suggesting that photo-diaries may  
84 provide a viable and practical tool to gain insight into children’s experiences of physical  
85 education and aspects that support their meaning-making.

### 86 **Theoretical Perspective**

87 Long accepted in physical education constructivist learning theories provide a useful  
88 framework for explaining children’s construction of their meaning-making around learning in  
89 physical education (Light, 2008; Rink, 2001). Although multiple definitions of  
90 constructivism exist, constructivist learning can be construed as “a self-regulated process of  
91 resolving inner cognitive conflicts that have often become apparent through concrete  
92 experience, collaborative discourse, and reflection” (Brooks & Brooks, 1993, p. vii). In  
93 constructivism, learning involves adaptation and change in the learner with learners  
94 constructing their own way of knowing (Rink, 2001).

95 Three major tenets of constructivism have implications for this study (Rovegno &  
96 Dolly, 2006). First, learning is an active process. From this perspective, children are not  
97 passive recipients of knowledge, but instead, learners who are actively attempting to create  
98 meaning (Rovegno & Dolly, 2006) through decision-making, critical thinking, and problem



124 child assent was given by all participants. The research was conducted in two Irish primary  
125 (elementary) schools. Participants were two teachers and the children in their classes (n=38;  
126 26 girls, 12 boys) aged 9-10 years.

127 St Mary's Primary School is a Catholic, middle class, all-girls school in a large rural  
128 town in western Ireland. The teacher had over 20 years experience as a primary teacher, but  
129 was not regularly involved in teaching physical education as provision in the school was  
130 dominated by external providers. She reported that the children generally experienced a  
131 variety of physical activities and that, as a group, they enjoyed physical education. During the  
132 six-week period of the research the children experienced a different activity each week:  
133 basketball, modern and folk dance, games from long ago, hockey, and novelty games.

134 The second school, Orchard Lane, is a non-denominational school in a large rural  
135 town in the east of Ireland. The teacher had over 10 years of experience in teaching and her  
136 class was a mixed, multi-grade fourth and fifth class. She reported that the children  
137 participated in physical education weekly, and experienced a variety of content from the  
138 curriculum throughout the academic year, usually 4-6 weeks per content area, and that as a  
139 group they loved physical education. During the six-week period of this project, the children  
140 experienced the end of an athletics unit (1 week) and most of a games unit (5 weeks).

## 141 **Research Design**

142 Across a six-week period, children's physical education experiences were examined  
143 using a combination of photographs and written entries in a journal – what we have termed a  
144 “photo-diary.” Design of the photo-diary was based on constructivist principles, aiming to  
145 promote personal responses from the children, fostering active engagement with their  
146 experiences, and allowing for both written and visual representations. Conscious that  
147 photographs by themselves offer multiple interpretations and cannot by themselves provide a  
148 complete narrative (Lemon, 2007) we combined the use of photographs with written

149 reflection in a visual diary (Chaplin, 2011). The cover page of the children’s diary included a  
150 space for each child to personalize their journal by depicting themselves in physical  
151 education. Next, using Vasily’s (2015) learning framework for elementary physical  
152 education, an uncomplicated explanation of learning in each of three learning domains was  
153 outlined in accessible language. The “heart” focused on the affective, thoughts and feelings  
154 about self and others. The “head” focused on the cognitive domain and included rules,  
155 strategies, and safety. Learning with the “hands” focused on physical skill learning. Separate  
156 pages for each lesson provided a space for the children to insert a photograph of their learning  
157 in physical education and a space to write a response to the prompt, “tell me about your  
158 picture and what you learned in PE today (head/heart/hands).” The last section of the diary  
159 included a page for final reflection on their learning in relation to head/heart/hands and  
160 consideration of aspects that helped and hindered their learning. Finally, the back of the diary  
161 contained a section for children to authorize use of the photographs they had taken in  
162 research outputs. Teachers reviewed the children’s diary entries on a lesson-to-lesson basis  
163 and recorded reflections in a teacher diary. The teacher’s diary began with a space to outline  
164 the content and purpose of the lessons they would be teaching. Then a separate page for each  
165 lesson outlined prompts for teachers to respond to as follows: “reviewing the PE diaries this  
166 week; highlighted to me that...; prompted me to...; and changed my plan/actions in the next  
167 class... .” Paper copies of both diaries were provided to each school.

168         The project was introduced to the teacher and children in their classroom by a  
169 member of the research team. First, the children’s diary was presented. Examples of each  
170 learning domain (head/heart/hands) were shared and discussed with the class. A poster of the  
171 three domains was placed in the classroom for future reference. A clear-cut protocol for the  
172 use of digital cameras was outlined and cameras were assigned to pairs of children. Children



173 asked questions about the procedures of taking photos, selecting photos for inclusion in their  
174 diaries, and then writing about their photos in their diaries.

### 175 **Data Sources**

176 Data sources included: (a) children’s photo-diaries, (b) teacher written lesson  
177 reflections, (c) photo-elicitation focus group interviews with children, and (d) individual  
178 interviews with each teacher.

179 **Children’s photo-diaries.** Final data for analysis included 38 children’s photo-  
180 diaries. The diaries contained up to six entries per child, giving a total of 228 separate diary  
181 entries including 228 photographs. The use of this type of methodology involves the power  
182 of the camera being turned over to the participants to document the images they choose.  
183 Working with children in this manner “can provide another layer of insight into individual  
184 lives by enabling researchers to view the participant’s world through their eyes” (Phoenix,  
185 2010, p. 99). In the results, these are referenced with a child’s initials and the word diary (i.e.,  
186 MO diary).

187 **Teacher Written Lesson Reflections.** Each teacher wrote a one-page written  
188 reflection following each lesson giving 12 one-page post-lesson reflections for analysis.  
189 Generally, both teachers responded to all three prompts each week and also kept some  
190 supplementary notes about each week’s lesson. These are represented in the results by the  
191 letter T and the data source, i.e., T diary.

192 **Photo Elicitation Focus Group Interviews.** Pair and small group interviews with  
193 the children (n=38;15 interviews) explored the pictures and narratives in their diaries, their  
194 learning in physical education, and their experiences of using cameras. The photo-elicitation  
195 interviews allowed children to discuss and share the meaning they made of their learning  
196 physical education, using the photographs and their diary narrative as a prompt to  
197 communicate with researchers as we sought to hear and understand what they were saying.

198 The interviews were open-ended with an orienting question about children's feeling about the  
199 image taking process. Subsequent questions addressed the specific images taken, focusing on  
200 why certain pictures were taken and the meaning they held. Interviews were 15-25 minutes in  
201 duration resulting in a total of 75 pages of transcription. In the results, these are referenced  
202 with a child's initials and the word interview (i.e., MO interview).

203 **Teacher Interviews.** At the conclusion of the initiative the classroom teachers  
204 participated in a one-on-one semi-structured interview (30-60 minutes duration). Questions  
205 focused on the influence of the dairies and their post-lesson reflections on their practice.  
206 These are represented in the results by the letter T and the data source (i.e., T interview).

### 207 **Data Analysis**

208 Data were analyzed inductively using an open and axial coding approach (Corbin &  
209 Strauss, 2008). Following familiarization with all data by each researcher separately,  
210 analysis took place in face-to-face meetings using hard copy data. Open coding involved  
211 looking for distinct concepts and categories within in the data. Axial coding engaged us in  
212 making connections between categories identified in the open coding process. First, the team  
213 reviewed and coded the photos and written text from each child. Interpretation of photo  
214 content was guided by the children's written explanations with a focus on what the image  
215 depicted including consideration of objects, setting, participants, and actions (Ledin &  
216 Machin, 2018). For example, we noted the content of photos included group-based game  
217 activities and individual skill performance images. Through discussion, patterns within codes  
218 were identified and key messages within the data agreed. One of the key messages identified  
219 at this point was that in each of the two schools, the children's photos were very similar to  
220 their classmates. To us, this suggested a common influence shaped the children's meaning-  
221 making and photo choices about their physical education learning. Next, children's  
222 interviews were analyzed in search of confirmation, explanation, and additional insight on the

223 key messages identified from the children’s photos. Again, a variety of understandings of  
224 physical education seemed to be reflected in photos, ranging from an emphasis on  
225 participation to one focused on skill learning. Then, teacher diaries and interviews were  
226 analyzed to provide further context and detail to illuminate the children’s experiences of  
227 physical education. Insight regarding the teachers’ approach was useful in contextualizing the  
228 meanings children represented in their photos. Finally, the children’s final written reflections  
229 were reviewed. These provided a summary of the children’s experiences and served to  
230 confirm our reading of the overall data sets. For example, the contrast between children’s  
231 abilities to reflect back on and describe their learning added weight to our thesis.

### 232 **Trustworthiness**

233         The trustworthiness of data analysis and interpretation was increased using two  
234 techniques: triangulation of data sources and researcher triangulation. The use of multiple  
235 data sources including teacher and children’s data from both interviews and photo reflection  
236 diaries supported identification of patterns across sources. Also, the face-to-face engagement  
237 of all three researchers in analysis of all data facilitated back-and-forth discussion supported a  
238 rigorous and thorough interrogation of key ideas and messages within the data set.

### 239 **Results**

240         The results are presented using two overarching themes: (a) varied meaning-making  
241 of learning in physical education; and (b) meaning-making of how they learned in physical  
242 education. Children’s photo-diaries were our primary data source to access how children’s  
243 understanding of learning in physical education was constructed. The photos provided a  
244 concrete representation of their experiences allowing them to share what was important in  
245 their physical education experiences. JN shared, “I wrote about the pictures and what  
246 happened in PE at the same time. That’s what I really did. I didn’t really decide. I really  
247 picked my best part in the whole of PE of what I learned” (interview). Children suggested

248 their photographs were an accurate representation of their meaning-making (see Figure 1). In  
249 addition, we drew on children's writings and interviews, and the teachers' data to explain  
250 children's constructed meaning, and to explore factors that influenced their meaning-making.

251  Insert Figure 1 about here

## 252 **Varied Meaning-making of Learning in Physical Education**

253 Children's meaning-making of learning in physical education varied in terms of  
254 complexity and focus. Fundamentally, children's photo-diaries included a visual  
255 representation of activities in which they participated. For all children physical education was  
256 active and their photos represented a wide range of physical activities in an enjoyable  
257 environment. Yet, what resulted from these activities was quite different. Two sub-themes  
258 represent children's meaning-making of their physical education experiences: (a) fun, and (b)  
259 participation with (out) learning.

260 *Fun.* In essence, the children captured the lesson activities in which they participated  
261 and the quality of those experiences. Almost every photo represented an enjoyable moment in  
262 activity. Photos demonstrated both children's enjoyment of physical education, as evidenced  
263 by smiling faces and animated body language and their reasons for enjoyment, such as being  
264 with friends and engagement in novel activities.

265 Photos were often of groups engaged in games and collective activity (see Figure 2).  
266 The regular inclusion of friends and classmates in photos acknowledged the social role of  
267 friends in making their experiences more enjoyable as was frequent indicated, "I chose to  
268 pick this picture because...I worked great with my partners and I liked this lesson" (LG,  
269 diary). Interestingly, photos of groups engaged in activity were more commonly selected by  
270 children who represented physical education as participation in activity without a specific  
271 learning focus.

272  Insert Figure 2 about here

273 Engagement with new and different content also enhanced children’s enjoyment, “it is  
274 good to try something new” (DL interview). Children photos often represented new content,  
275 such as hockey and modern dance. Photos of engagement (Figure 3) in these new activities  
276 allowed the children to represent the importance of novelty in their physical education  
277 experience often in comparison to the past where, “We would usually just play little games  
278 and go inside. Our PE was not fun because we always do the same kind of things” (KH  
279 interview). For all, fun was an important quality of the physical education experience. For  
280 them the connection between fun with learning was obvious, “When you enjoy it, you want  
281 to learn about it” (ES interview).

282 Insert Figure 3 about here

283 ***Participation with(out) learning.*** In some cases, children’s photos were simply a  
284 visual “record of what you were doing” (EN interview) showing individuals and groups of  
285 children participating in a range of activities. These photos allowed children to share the  
286 meanings they took from these lessons, primarily related to engagement with a variety of  
287 content with children writing about their photo by listing the activities experienced during the  
288 lesson: “This week we done hopscotch, skipping, and queeny, queeny” (LC diary) or “one  
289 week it was dodgeball, one week it was unihockey, one week it was basketball” (DL; see  
290 Figure 4). Photo content and descriptions suggested their understanding of physical education  
291 was as a time of active participation. Physical education as a learning time was clearly not a  
292 priority, as one boy said, “we didn’t really pay attention to what we learned, we just did it and  
293 when it was over and done with we just forgot” (LS interview).

294 Insert Figure 4 About here

295 Alternatively, other children’s photos not only portrayed activities, but were an  
296 attempt to demonstrate visually what had been learned while participating in the activities.  
297 Not surprisingly, what children represented as learning in their photos varied. For some

298 children, responses were identified as “learning” but were more accurately a description of  
299 content that simply equated doing with learning as previously described. For others, there  
300 was a distinction between learning and doing, “what you did is more the stuff you did and  
301 what you learned is more like what you actually learned and what you remember” (SC  
302 interview). Still, many of these children explained their photos in very inexact terms that  
303 could be applied to almost any physical education lesson. Their responses were void of  
304 details related to learning from the lesson activities they had experienced. For example, while  
305 most children indicated they had learned new skills they did not represent the skill in their  
306 photo or name the specific skills they had mastered. These children struggled to identify  
307 learning in the psychomotor, cognitive, or affective domains. Their learning with the head,  
308 heart, and hands seemed vague and generic. LC wrote that, “We learned with the head by  
309 remembering. We learned by the heart by playing fair. We learned with the hands by  
310 moving” (diary). RA indicated “you had to concentrate for that game and then I learned with  
311 my hands with the Queanie, Queanie. Oh and I learned with my heart for, I got stuck on that  
312 one” (diary).

313 Lastly, there were children whose meaning-making about physical education had  
314 clear connections to what they had learned. Analysis of the photos chosen for their diaries  
315 revealed that most photos captured individual psychomotor learning or ‘learning with the  
316 hands.’ Their photos were intended to represent specific aspects of technique that led to  
317 enhanced performance (see Figure 5). Their photos provided a visual representation of their  
318 learning (see Figure 6).

319  Insert Figure 5 about here

320 By moving beyond descriptions of content to offer interpretations of their photos that  
321 emphasized the position of their hand or the intention of their action children illustrated an  
322 understanding of physical education in which learning featured. For example, AN explained

323 the importance of his learning to sweep the hockey stick, “if you hit it hard if it bounces off  
324 someone’s stick it could go very far back into your own goals and if you sweep it you could  
325 change direction very quickly to dodge enemy team members” (interview).

326 

Insert Figure 6 about here

327 Representing learning with the head and heart within photos was more challenging  
328 than learning with the hands. Despite this, children drew on their photos to describe learning  
329 in the cognitive and affective domains. Beyond the recall of cues reflected when describing  
330 their pictures, their diaries indicated learning about the use of skills. These descriptions and  
331 examples were quite detailed, “I learned how to use my head when I am trying to shoot, but  
332 somebody’s blocking me, you just move to the side” (EA diary). Some children were also  
333 able to capture learning in the affective domain (see Figure 7) choosing photographs to  
334 represent moments when they felt they had achieved ‘learning with the heart’ in a lesson.  
335 Children’s photos of group-based activities allowed them to describe qualities of the  
336 experience that were important to them related to learning with the heart, for example “my  
337 team were cheering me on while I was playing. Lots of people were kind” (PO diary). A  
338 photo of a ball being passed to a teammate represented learning related to “you should always  
339 pass to your teammates cos there is no ‘I’ in team” (CG diary).

340 

Insert Figure 7 about here

341 The children were perceptive about challenges in representing their learning. While  
342 they often recognized learning had occurred, at the same time they had difficulty visually  
343 capturing the learning, even in the psychomotor domain. In an interview PN shared,

344 

It was kinda difficult cause sometimes you wanted to take a motion picture, like in  
345 basketball if you were dribbling you want to take a motion picture, you have to click  
346 the button, then you have to bounce the ball and the ball would kinda be in mid-air.

347 Despite challenges in capturing the totality of experience using photos, the children were  
348 successful in sharing the meanings they took from their physical education experiences with  
349 emphasis on active fun participation in physical activity with others.

### 350 **Meaning-making of How They Learned**

351 Taking, selecting, reflecting on, and writing about photographs helped children to  
352 make meaning of their physical education experiences, and, for some, was an opportunity to  
353 explain how that learning happened. Two sub-themes represent the influences on children's  
354 learning experiences.

355 *Multiple influences on learning.* Some children were better than others in describing  
356 both what they learned and how they learned. The assorted meanings children made of their  
357 physical education experiences prompted us to examine in more detail factors that may have  
358 shaped these understandings. Children's photos showed them actively participating but the  
359 work they, and others, did to promote their learning was not necessarily evident from solely  
360 looking at the photos. While photos allowed children to show what they did and their  
361 enjoyment of it and in some cases what they learned, photos were more limited in  
362 demonstrating how that learning happened and the qualitative nature of their engagement.  
363 The photos did, however, provide a springboard for children to respond to a written prompt  
364 considering what had helped their learning and supported discussion of their learning in  
365 interviews. Children's understandings of what influenced their meaning-making, included  
366 their own personal actions, their peers, and the teacher.

367 Children identified their learning process as active, "I learned it as I was playing.  
368 Every time as I did an action or anything I just learned something" (YN interview). Learning  
369 was synonymous with doing and enhanced by actions such as listening and concentrating.  
370 Reviewing their own photos also an active process that helped children make sense of their  
371 experiences "when we stuck in the picture with glue we could look at it and remember where





396 Children's suggestions when asked how they expected the teacher to engage with their diaries  
397 revealed understandings of their teacher's purpose. Some identified fun as most important, "it  
398 could help her to know what we enjoyed, what exercises we liked" (EK interview). Others  
399 equated their teacher's intent as helping them to improve, "she might see what we are not  
400 good at and what we are good at and what we need to work on better" (LL interview).

401         The teacher's intent shaped children's understandings of their physical education  
402 experiences in a number of ways. The children who identified their own actions as being  
403 what aided their learning held several things in common. They were the children who  
404 recorded the activities done, identified enjoyment as the primary outcome of physical  
405 education, and were unable to describe with any detail what had been learned in physical  
406 education; and, they were largely in the class of a teacher whose focus was on children's  
407 enjoyable participation in physical education. This teacher's strategy to deliver a variety of  
408 content where children engaged with new activities every week provided novelty of  
409 experience, which the children enjoyed. All of her diary reflections reported on the  
410 enjoyment of the girls. She noted "how much they love PE" (diary). This therefore  
411 reinforced her continuance with the introduction of new activities each week as her physical  
412 education programme planning strategy. This teacher outlined learning as an incidental by-  
413 product of fun participation in activities. She did not plan for specific learning or articulate  
414 learning goals for each lesson. Instead, she described 'doing' the activity of the lesson and  
415 identified objectives in broad terms such as "develop an understanding of the game,  
416 appreciate and enjoy, learn new skills" (diary). Her lack of structure and identification of  
417 specific learning intentions resulted in some children being unable to identify their learning  
418 and others inferring learning based on past experiences. Despite the lack of teacher direction,  
419 the children saw value from their participation, equating learning with doing was their reality.

420 In contrast, the other teacher took a more focused and structured approach to teaching  
421 physical education; learning was at the forefront. First, she identified learning outcomes for  
422 each lesson and used verbal cues to scaffold learning. As a result, the children used this  
423 language consistently in describing their learning (see Figure 5). The emphasis on learning in  
424 these children's data is indicative of how the teacher planned the lessons and how she taught.

425 The teacher promoted a mastery climate valuing learning: "children like to be told  
426 how to do something properly" (T interview). If there was something she could not  
427 demonstrate she provided YouTube clips and videos so the children could see the skills  
428 demonstrated by 'experts.' Children valued the use of videos in supporting their learning. YZ  
429 commented, "Well, the teacher was going through how to hold the ball properly so she was  
430 teaching us how to do it" (interview). In more detail he described,

431 When we were doing basketball and we were doing 3-on-3 games she went to her  
432 laptop and showed us a little tutorial of how to play and some others of basketball and  
433 dribbling. All of this and I think that this really helped us to do it. (interview)

434 The teacher provided additional support for children's learning as the need arose and  
435 used the photo-diaries as a feedback mechanism to focus on specific aspects of her teaching  
436 and the children's learning. She explained, "I was more aware of what I was teaching them  
437 and I think that lead to a more structured approach to PE which I think was more beneficial  
438 for the children" (T interview). She used the photo-diaries to channel the children's attention  
439 on aspects of their learning. For example, prompting them to think about capturing their  
440 learning in the photographs and writing about their learning. The teacher noted, "I think  
441 getting them to reflect on the PE lesson helped them become more reflective 'ok what did I  
442 learn, what do I need to improve on or what worked well'" (T interview).

443 The specific guidance from this teacher may, in part, explain the similarity in photos  
444 from children in her class where children demonstrated the same skill in their photos and

445 used the same cues to describe what was happening in the photos. It is noteworthy that the  
446 children in this teacher's class almost all identified their teacher as helping them to learn.  
447 While photo-diaries did allow children to personalize their learning and how they learned, the  
448 outcome of their learning reflected teacher intent.

### 449 **Discussion and Conclusion**

450 The purpose of this study was to understand teaching and learning in primary physical  
451 education through the use of photo dairies. Specifically, we sought to understand children's  
452 meaning-making of learning in physical education and the activities that influenced these  
453 perspectives. From one perspective the results shed light on children's construction of  
454 learning in physical education, while on the other hand the photo-dairies became a defacto  
455 pedagogy tool allowing children "to creatively make sense of themselves and to reflect on the  
456 ways they create their identities and their bodies, not only verbally but also visually"  
457 (Azzarito, 2010, p. 158). Lastly, following Azzarito's (2013, p. 1) call to include visual  
458 images in research design in an effort "to understand and provide a more problematized  
459 picture of the nuances and multifaceted embodied experiences of people," the methodology  
460 provided access to children's meaning making. We draw on aspects of constructivist learning  
461 theory to explore the value of photo-diaries to children's construction of their meaning-  
462 making around learning in physical education.

463 First, for these children learning was active, social, self-regulated, and linked to past  
464 experiences. Through images of performing and participating in physical activities the  
465 practical and embodied nature of their experiences illustrated their understanding of physical  
466 education as a 'doing' activity and emphasizing the body's role in learning (Light, 2008).  
467 Yet, the children's construction of learning in physical education identified learning that was  
468 not only physically active, but also cognitively and emotionally active integrating movement  
469 content and cognitive processes (Rovegno, Chen, & Todorovich, 2003).

470 This construction of meaning in physical education occurred in an environment that  
471 was, first and foremost, fun. Fun represented a social environment that included friends and  
472 novel activities. Friends not only made the overall experience socially enjoyable, but shared  
473 in the learning of their classmates by providing feedback and assistance reflecting the active  
474 use of cognitive processes such as analysis, reflection, and critical thinking (Rovegno &  
475 Dolly, 2006). Yet, while friends shared in the experience, the role of the self in learning was  
476 highlighted. In essence, these children constructed learning in a group setting where  
477 individual and social processes occurred concurrently and interactively (Borko, Mayfield,  
478 Marion, Flexer, & Hiebert, 1997) emphasizing the notion that meaning making occurred  
479 through interactions with others and with the environment of the physical education space.

480 For these children the current active and social environment was juxtaposed against  
481 previous physical education experiences. In creating this juxtaposition children were able to  
482 identify ways in which the current environment had positive influences on their meaning-  
483 making or learning and that their previous conceptions of physical education learning (or lack  
484 thereof), might well have been inaccurate and incomplete. Interestingly while prior  
485 misconceptions have been identified as hard to change, for these children, the change was  
486 quite obvious and readily acknowledged. As a result, they were able to take learning beyond  
487 doing to a deeper understanding of what they were doing and why (Rovegno & Dolly, 2006).  
488 A word of caution is however warranted; the children who equated participation with  
489 learning considered each new activity a new learning opportunity, suggesting they had little  
490 appreciation for learning across time or what the development of deep and rich learning  
491 might entail.

492 Second, the photo-diaries became a pedagogical tool allowing children to actively  
493 engage with making sense of their experiences. The photo-diaries offered a scaffold for  
494 children to personally construct knowledge as well as a means to represent this knowledge.

495 Children were active taking photos, which formed part of their meaning-making about  
496 learning allowing them to be creatively and practically engaged (Thomson, 2008).  
497 Positioning the child at the center of the process recognized their role as expert on their own  
498 world and focused on their own personal meaning-making (Thomson, 2008). Jones, Santos,  
499 Mesquite and Gilbourne (2012) suggest that visual methods might be considered as ‘quasi-  
500 constructivist,’ suggesting reality is “not simply captured in a photograph, but chosen,  
501 interpreted and framed by the photographer” (p. 268). In this study, children actively  
502 constructed their images; they posed and took multiple images to represent their intent. In  
503 making these choices, photo-diaries allowed children to “speak for themselves” and may  
504 have been particularly liberating for children who found communicating their experiences  
505 through words more challenging (Thomson, 2008).

506         Writing about their selected image was an active process of constructing meaning  
507 from experience. The diaries were a record of their physical education experiences and while  
508 some children simply described what they did, for others, engagement with the diary  
509 promoted reflection regarding what they had learned and what was important to them.  
510 Connections to previous knowledge acted as a scaffold to build new understandings  
511 comparing current physical education experiences to past physical education experiences.  
512 The use of cameras in physical education was also novel and reflection on photos helped  
513 children gain new perspectives about their own participation. In particular, watching other  
514 children perform and taking their photos provided legitimate moments for children to step  
515 outside of physical participation to observe and make sense of experiences in new ways.

516         In another sense, the photo-diary processes promoted interaction with others, pair and  
517 group activity, and the application of knowledge as integral to learning. While the meaning-  
518 making about their learning ascribed to events was individual or personal, the social and  
519 shared nature of meaning-making was acknowledged. Photos accommodated consideration of

520 the factors that influenced children’s physical education experiences, such as friends, teacher  
521 approach and lesson context.

522         Lastly the use of the photo diaries gave others access to the children’s world  
523 (Thomson, 2008). As reported by others (Patton & Parker, 2009) we found that photos helped  
524 us to understand the nuances of children’s experiences. By communicating what was  
525 important to them in their learning, we were better able to appreciate what influenced the  
526 quality of these children’s learning experiences. Similar to others who have used visual  
527 methods to capture children’s perspective about learning to inform a teacher’s approach to  
528 physical education (Goodyear, Casey, & Kirk, 2014) the children hoped that their sharing  
529 would influence future teacher actions.

530         Within a constructivist frame, the influence of the teachers’ approaches on children’s  
531 meaning-making merits consideration to the meaning children constructed about their  
532 learning. One teacher was focused on providing fun learning opportunities; learning was a  
533 by-product of doing, and it was not predetermined what that learning might be. Thus, the  
534 meaning-making of physical education for some children in this class remained fixed on  
535 participation and enjoyment. Other children within the class, perhaps by drawing on past  
536 experiences, were able, to varying degrees, to identify learning from their physical education  
537 experiences. While it might be considered that this environment supports constructive  
538 learning, approaches such as this may serve to misconstrue constructivism. Authors  
539 (Clements & Battista, 2009; Rovegno & Dolly, 2006) are clear that a constructive approach is  
540 not undirected or unguided learning. Instead a teacher, who supports constructivist learning  
541 poses tasks that bring about “conceptual reorganization” by structuring the cognitive and  
542 social climate of the classroom (Clements & Battista, 2009, p. 7). A constructivist learning  
543 experience should be structured just enough to make sure the students get clear guidance and  
544 parameters within which to achieve the learning objectives, yet be open and free enough to

545 allow for the learners to discover, enjoy, interact and arrive at their own, socially verified  
546 version of truth (Clements & Battista).

547         Alternatively, the second teacher was intentionally focused on what the students  
548 knew, brought with them to the classroom, and how they were understanding (Rovegno &  
549 Dolly, 2006). This teacher adopted a range of strategies to focus on children’s thinking about  
550 their movement (Ennis, 1991). Almost all children in this class identified learning in each  
551 lesson that aligned with the teacher’s intention, and was similar to the learning identified by  
552 all their classmates. In this case, the photo-diaries provided children with an opportunity, to  
553 some extent, to personalise and make sense of their experiences as individuals beyond  
554 performance of a specific skill and knowledge of cues related to the skill. The information  
555 shared by the children allowed the teacher to support and accommodate individual learner  
556 experiences and address gaps in their learning. This teacher used the photo-diaries as an  
557 important source of feedback about student experiences and to make inferences about their  
558 progress in learning.

559         Ultimately, it is encouraging that photo-diaries can play a role in learning by allowing  
560 children to articulate their learning. Researchers have recognised that photos have “power to  
561 focus the eye (and the mind) and evoke emotions” (Freeman & Mathison, 2009, p. 110). Our  
562 focus was on an everyday moment of children’s lives, participating in physical education.  
563 Pope (2010) illustrates how photo-based research can add value to these moments: “the more  
564 we look, the more we see; the more we see, the more we learn; the more we learn, the more  
565 we understand” (p. 205). This observation is played out in the current project as the photo-  
566 diaries helped to focus the children’s eyes on themselves as learners and allowed for  
567 reflection on those learning experiences.

568         A number of interesting points emerged in relation to what photos could or could not  
569 represent. First, photo-diaries allowed children to communicate how they conceptualized fun,



570 an oft-elusive concept to pin down. Understanding the nuances of their experiences and what  
571 influenced individual's enjoyment can help teachers to develop learning environments that  
572 reflect enjoyment. Second, for these children, the body and physical performance of skills  
573 were privileged in photos. Affective and cognitive learning were much less represented.  
574 While this may reflect the content of lessons and teacher intent, it also raises questions about  
575 what can be captured in a photo. We explain this by suggesting that such learning is more  
576 difficult to show in a photo and indicate value in combining visual methods with others, in  
577 our case written reflections and interviews, to contextualize the images. While the photos  
578 were a legitimate hologram of children's' learning and have merit as a stand-alone  
579 representation of experience, allowing children to communicate their experiences in other  
580 forms provided a richness to emerge in ways that avoided any imposition of narrative by the  
581 researcher.

582         In the end, what is clear is that photo-diaries show considerable potential as a means  
583 to support and enhance children's meaning-making as learning in physical education. The  
584 process of constructing diary entries supported children to engage with, reflect on, analyze  
585 and share their meaning-making about their learning. The inclusion of visuals helped children  
586 make sense of their learning in physical education in ways that positioned the body as central  
587 to their experience. The design of photo-diary processes complimented and promoted  
588 constructivist learning. Most importantly, photo-diaries supported these primary-aged  
589 children to share their meaning-making, their interpretations of their experiences and their  
590 learning on their own terms.

591         From a methodological perspective, the children in our research were aged 9-10.  
592 While similar photo-based methods have been used in physical education with older children  
593 (Azzarito, Simon, & Martinen, 2016; Enright & O'Sullivan, 2012) and in out-of-school  
594 contexts (Noonan, Boddy, Fairclough, & Knowles, 2016), few have been used with young

595 children. We suggest a shift is needed from children's current understanding of camera use in  
596 physical education as a novelty to children using visual images, such as drawings and photos  
597 on a regular basis to enhance teaching and learning experiences. Such approaches allow  
598 access to children's meaning-making about their learning and holds the potential for children  
599 to consider what was meaningful about those experiences (Beni, Fletcher, & Ní Chróinín,  
600 2017).

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