

1 **Rethinking the relationship between pedagogy, technology and learning in health**
2 **and physical education**

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18 **Abstract:** This paper seeks to address two key questions: 1) how could a
19 pedagogically-driven approach to the use of DigiTech in HPE benefit young people's
20 learning; and 2) what steps are required to develop new DigiTech pedagogies? The
21 paper is a response to the largely pessimistic views presented in this journal by Gard,
22 Lupton and Williamson about the role of technology in Health and physical Education
23 (HPE). In this paper, we argue that while we need to be aware of the risks, we also
24 need to explore the opportunities for digital technologies (DigiTech) to shape HPE in
25 new and positive ways. Specifically, we argue that a focus on pedagogy is largely
26 missing from earlier discussions. In mapping the evidence base on DigiTech against a
27 three dimensional categorization of pedagogy – in the form of learners and learning,
28 teachers and teaching, and knowledge and context (Armour, 2011) – we are able to
29 demonstrate the value of a pedagogically-informed debate on this topic. The paper
30 concludes by arguing for a 'profession-wide' debate to co-construct, trial and evaluate
31 new ways in which we should – and should not – use DigiTech to optimise young
32 people's learning in HPE.

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34 **Key Words:** Digital Technology, Pedagogy, Emerging Technologies, Emerging
35 Practices, Digital Learning

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62 *young people's learning; and 2) what steps are required to develop new DigiTech*
63 *pedagogies?* First, we provide a brief overview of Gard, Lupton and Williamson's
64 arguments. Second, drawing on existing knowledge, we consider the relationship
65 between DigiTech and pedagogy using a three dimensional categorisation of
66 pedagogy. Third we make the case for the potential benefits of building new links
67 between DigiTech and pedagogy in HPE and consider the 'what next?' question. In
68 particular, we seek to mobilise the HPE profession, including both practitioners and
69 researchers, to engage in a 'profession-wide' debate to co-construct, trial and evaluate
70 new ways in which we should – and should not – use DigiTech to optimise young
71 people's learning in HPE.

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73 **1. Gard, Lupton and Williamson – an overview**

74 Gard (2014) introduced the concept of 'eHPE', which he defined as HPE's "ongoing
75 investment in public health" and "digital technology" (p.828). Gard's argument about
76 DigiTech is grounded in his longstanding critique of the presumed link between
77 physical education and health, and the subsequent claims HPE scholars have made
78 about the role DigiTech will play in helping HPE improve health (c.f. McKenzie and
79 Lounsbery, 2013). Gard (2014) claims that DigiTech will intensify negative
80 discourses of and related practices in "measurability, accountability, performativity
81 and standardization" (p. 833). As a result, Gard argued that HPE will promote "the
82 punitive, judgemental, time-consuming, intellectually arid and potentially unhealthy
83 surveillance of [young people's] bodies and behaviour" (p. 835). HPE, in Gard's
84 view, will be forced into a world that thinks "being healthy is a simple matter of being
85 told, adopting and repeating a set of easily describe behaviours" (p. 839).
86 Consequently, Gard (2014) suggested that "flesh and blood teachers" (p. 831) are at

87 risk of being replaced by health-related DigiTech. In other words, the perceived
88 capabilities of DigiTech could further endorse societal, economic and politically
89 supported discourses of performativity in education (see Evans, 2013; Apple, 2007),
90 meaning that teachers no longer have their traditional role in promoting physical
91 activity and health.

92 Similar to Gard, Lupton (2015) was pessimistic about the role of teachers in
93 HPE as a result of the growth of DigiTech in education. Lupton (2015), however, was
94 particularly concerned about the dangers of DigiTech leading to a whole school
95 approach to data-led surveillance of each individual child. Lupton (2015, p. 126)
96 suggested that the proliferation of health promotion and fitness apps and self-tracking
97 devices means that it is only a matter of time before “the ethos and practices of self-
98 responsibility” come to represent “key forces in behaviour change” for young people
99 in HPE. Drawing on her own typology of five modes of self-tracking (see Lupton,
100 2014), Lupton (2015) challenged the reader to consider how long it will be before
101 ‘private’ self-tracking becomes ‘communal’ (i.e. in a class), ‘pushed’ (i.e. teacher
102 initiated), ‘imposed’ (i.e. health interventions), and ‘exploited’ (i.e. used for the
103 purposes of others). Consequently, Lupton (2015, p. 127) posed a controversial
104 question about the likelihood of reaching a situation where “students are forced to
105 wear heart-rate monitors to demonstrate that they are conforming to the exertions
106 demanded of them by the HPE teacher?” Nevertheless, it is also possible to argue for
107 another more positive way of viewing this issue. Other subject areas in the school
108 curriculum, including Maths, English and Science, are making extensive use of
109 learners’ data to drive more personalised forms of learning (see Apple, 2007). Perhaps
110 it is possible to argue for new pedagogically-appropriate futures for HPE based on the
111 use of individuals’ health and fitness data? We will return to this issue later.

112 Williamson (2015) was similarly pessimistic about the proliferation of
113 DigiTech in education, arguing that wearable technologies¹ will eventually control
114 and govern the educational process. In this scenario, Williamson (2015, p. 135)
115 claimed that HPE could become a site where the use of existing DigiTech such as
116 “fitness testing, movement analysis software, kinetic videogaming and digital
117 pedometers” (Williamson, 2015, p. 135) will be replaced by an “algorithmic skin”
118 (p.133). This skin was defined as “an artificial informational membrane that
119 continually interacts with, and is activated by, a densely coded informational
120 environment” (ibid, p. 148). As a result, Williamson predicted that commercially
121 produced DigiTech will begin to govern the educational process because of its
122 capabilities to produce ‘evidence-based’ results. Here again, however, a counter view
123 might be that – at the very least - such results are based on real rather than proxy and
124 rather unreliable or self-reporting evidence. Through an algorithmic skin teachers
125 could access new forms of evidence about young people’s physical activity levels.
126 Comparably to Sandaña (2014, p.4) we might argue that such “data is a gift, so be
127 thankful when it is given to you”.

128 In summary, Gard, Lupton and Williamson have outlined ways in which a
129 data-driven society - exaggerated by the use of DigiTech– could lead to levels of body
130 surveillance that are unintended, unimagined and/or untested. This is a future for HPE
131 that seems to bypass teachers. In other words, DigiTech could ultimately deprive
132 teachers of the opportunity and capability to teach. Yet, how realistic – or indeed
133 unduly pessimistic - are these dystopian views?

134 The three authors made little attempt to ground their arguments in the
135 evidence base on (i) what kinds of DigiTech young people and their teachers use

¹Wearable technologies are variously described as “self-tracking, personal informatics, personal analytics or technologies of the ‘quantified self’” (Williamson, 2015, p. 134).

136 currently in and beyond formal HPE settings; (ii) teachers' and young people's
137 contemporary views on DigiTech; and (iii) the pedagogical implications of the wider
138 physical, social, and economic architectures of schools and classrooms that support
139 technology-mediated teaching and learning. In other words, it seems that what is
140 missing in their arguments is a focus on the potential for new pedagogies of
141 DigiTech; for example, current or imagined links between pedagogy and DigiTech
142 that could work to enhance or even 'accelerate' (Fullan, 2013a) young people's
143 learning in HPE. In the next section, therefore, we use a three dimensional concept of
144 pedagogy as a framework for addressing our first question: *how could a*
145 *pedagogically-driven approach to the use of DigiTech in HPE benefit young people's*
146 *learning?*

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148 **2. The pedagogies of DigiTech in HPE**

149 Pedagogy is a complex and slippery concept with a range of definitions (see Dron,
150 2014). Nonetheless, a widely adopted conceptualisation in physical education and
151 sport pedagogy is that pedagogy is the connection between three dimensions, (i)
152 learners and their learning, (ii) teachers and their teaching and (iii) knowledge in
153 context (Armour, 2011; Quennerstedt et al., 2016). As Armour (2011, p.14) put it:
154 "the key point to grasp about any pedagogical encounter between teacher/coach and
155 young learner is that all three dimensions of pedagogy are present and interacting". In
156 this categorisation of pedagogy, the learners/learning dimension "foregrounds
157 children and young people as diverse learners and the ways in which they can be
158 supported to learn effectively" (*Ibid*, 2011, p.13); the teachers/teaching dimension
159 positions teachers as lifelong learners "who continuously and critically reflect upon
160 their personal capabilities to meet the needs of young learners" (*ibid*, p.14); while

161 knowledge/context refers to the value that is placed on what is selected to be taught or
162 learnt and the contingent contextual factors. But, how does a focus on the three
163 dimensions of pedagogy shed new light on the potential of DigiTech to support
164 learning in and beyond HPE?

165 *Learners and learning*

166 In 2016, teachers and other educators are faced with a generation of young learners
167 who identify with selfies, hashtags, and emojis, and who see sharing, liking, tweeting,
168 blogging and vlogging as everyday practices (Rich & Miah, 2014; Selwyn & Stirling,
169 2016; Tom, 2012). Digital devices, applications (apps²) and social networking sites
170 are readily accessible and are used by many young people on a daily basis (Greenhow
171 & Lewin, 2016; Lenhart, 2015). It has been estimated, for example, that 71% of
172 American adolescents use the social networking site 'Facebook' as a platform for
173 communication (Lenhart, 2015). This use of social media by adolescents is, perhaps,
174 unsurprising given that:

- 175 i) Children begin web 'surfing' and accessing social media from as young as age
176 four (Taranto et al., 2011);
- 177 ii) Young people are being deliberately targeted as consumers of DigiTech
178 (Williamson, 2015; Öhman et al., 2014); and
- 179 iii) DigiTech is accessible to a wide range of youth in diverse socio-economic
180 contexts (Greenhow & Lewin, 2016).

181 The seemingly unstoppable growth in young people's engagement with DigiTech in
182 their personal lives (Rosen, 2010; Selwyn & Stirling, 2016) means that these
183 technologies are socially and culturally relevant. Although, as Rosen (2010) suggests,
184 the social relevance of DigiTech could act as a type of leverage to engage young

²An application programme is a computer programme designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user

185 people in learning, there are significant risks to young learners and on this point we
186 agree with the arguments of Gard, Lupton and Williamson.

187 Health-related - extending to medical - DigiTech has the potential to have a
188 profound positive or negative impact on young people's learning about health,
189 physical activity and the body, both within and outside of formal education
190 experiences. On the negative side of the argument, the social construction of
191 particular body ideals is evident in the popular practice of taking and posting 'selfies'
192 (Miguel, 2016; Warfield et al., 2016). Extending 'old media', selfies exaggerate the
193 self-presentation of filtered, gendered, ideal and 'perfect' bodies because they are
194 socially constructed, actualized and re-enforced through online networks (Warfield et
195 al., 2016). This is a particular concern when a connection is made between the images
196 presented and shared in selfies and presumptions made about 'health' (see, for
197 example, healthyselfies.org) and, what we might term, *un-healthy* selfies. Further
198 illuminating the concerns raised about 'teen magazines' and 'size 0' discourses
199 (Kerner, 2013), there is evidence that young people are using selfies as a
200 communication mechanism through which to engage with specific groups and that
201 this acts to reinforce un-healthy discourses and behaviours (see #thinkspiration on
202 Twitter as an example). What we can conclude from these examples is that the rise of
203 'healthism' (an ideological, neo-liberal and public construct of health) in adults, and
204 concerns about individual autonomy, self-monitoring and obsession/addiction seen in
205 social media (Lupton, 2015) are also growing concerns for youth (Rich & Miah,
206 2014).

207 Further risks arise from the extensive digital footprints that young people are
208 creating and, as is the case of in HPE, the digital footprints teachers might be
209 encouraging young people to create. Halford (2016), for example, raised questions

210 about what is considered public or private on social media sites. In challenging what
211 might be considered ‘private’, Halford (2016) suggested that a person, a company or
212 even the host site (e.g. Facebook) are able to access the digital data, regardless of
213 privacy protection plans, guidelines, and regulations. The HPE profession must
214 consider, therefore, whether digital images, and personal data about the body and/or a
215 child’s health generated in HPE lessons could and should be accessible to others
216 outside of the education content.

217 Yet, there is another way of looking at learners and learning and DigiTech in
218 HPE. For example, as seen in other educational contexts (see Greenhow & Lewin,
219 2016), there is significant potential for teachers to connect young people’s uses of
220 DigiTech with their learning experiences in HPE. Indeed, because DigiTech already
221 provides an accessible and potentially rich resource for learning about health, physical
222 activity and the body, it could also provide a useful resource for teachers to construct
223 and deliver forms of knowledge to young people in ways that are engaging,
224 immediate and attractive (Casey, Goodyear & Armour, 2016). Calls from political,
225 research and practice fields certainly seem to support such a view, highlighting the
226 urgent need to understand how technologies can support young people’s learning in
227 optimal ways (Fullan, 2013a; DCMS, 2015; UNESCO, 2015; Kong et al., 2014). It is
228 certainly safe to assume that DigiTech will influence young people’s learning about
229 physical activity and health regardless of the position a teacher takes on the matter.
230 There is clearly a need, therefore, for further critical, informed and profession-wide
231 debate around the rise of ‘healthism’ and the ethical issues of DigiTech and what this
232 means for learners and their learning. In line with Gard, Lupton and Williamson, we
233 agree that it is unacceptable to ‘glorify’ the capacity of DigiTech to educate, and yet
234 to be unaware (or plead ignorance) of the implications; for example, the ethical

235 challenges posed by public data. The prevalence of DigiTech in the lives of young
236 people, however, means that teachers cannot simply ignore the dangers whilst
237 simultaneously grasping the opportunities of DigiTech. So what is the evidence on
238 teachers' views on and uses of DigiTech in HPE?

239 *Teachers and teaching*

240 Any debate about the role of DigiTech in HPE must have a focus on the role
241 of teachers given the arguments that teachers have the greatest impact on students and
242 their learning (Hargreaves & Fullan, 2012; Hattie, 2012, 2009). When compared to,
243 for example, the school context, parents, home, resources, or the quality of a school's
244 leadership, it is consistently argued that teachers are highly influential (Apple, 2007)
245 and should be placed at the forefront of reform efforts to improve education
246 (Hargreaves & Fullan, 2012; Hattie, 2012, 2009). Clark (1995, p.3), for example,
247 argued that "teachers are the human point of contact with students. All other
248 influences on the quality of education are mediated by who the teacher is and what the
249 teacher does". Developing a knowledge-base about what teachers learn, do and
250 practise is, therefore, vital for the creation of effective and contemporary policies,
251 programmes and practices (Cordingly et al., 2015; Hattie, 2009). Yet, what teachers
252 think, say, and do with DigiTech has received rather little consideration.

253 While DigiTech is celebrated for its "astounding and abounding creativity"
254 (Fullan, 2013a, p.36), it has been argued that innovation in its use in education has
255 stagnated (Apple, 2006; Robinson, 2011). Few teachers are able to incorporate
256 DigiTech into the pedagogical context in purposeful ways that extend pedagogical
257 capacity (see Fullan, 2013a). While there is much talk about how the latest 'gizmos
258 and gadgets' could leverage young people's learning (Rosen, 2010), and the ways in
259 which 'big' edu-businesses are focussed on designing and marketing educational

260 DigiTech to ‘transform’ teaching and learning (Enright et al., 2016; Gard, 2014;
261 Lupton, 2015; Williamson, 2015), technology-mediated teaching and/or learning is
262 not a mainstream practice. Indeed, Fullan (2013a) among others (c.f. Hastie et al.,
263 2010; Palao et al., 2015; Selwyn, 2015), has argued that the use of DigiTech in
264 schools is “conspicuous by its absence or by its superficial, *ad hoc* use” (p.13).
265 Vrasidas (2014), similarly, reported that only 35% of teachers use DigiTech in the
266 classroom, while Sipilä (2013) demonstrated that almost half of teachers feel under-
267 prepared to use DigiTech to support learning. In the context of HPE, Kretchmann’s
268 (2015) small-scale study in Germany indicated that half of teachers surveyed felt they
269 had enough experience to integrate DigiTech into HPE. Yet more than 80% of
270 teachers suggested that they did not have enough pedagogical knowledge and
271 experience of how integrate DigiTech effectively and that they wanted access to more
272 pedagogical scenarios that exemplified DigiTech use in HPE. Indeed, most teachers
273 expressed a preference for traditional technology (i.e. images and blackboards), rather
274 than, for example, more recent collaborative, user-focussed, and interactive
275 technologies, such as social media, apps, and ‘mobile’ devices.

276 The evidence-base on teachers, therefore, seems to suggest that while young
277 people are active users and consumers of DigiTech, teachers are resistant and they
278 struggle to integrate DigiTech in pedagogically sound or innovative ways. The
279 literature suggests that large numbers of teachers are either resistant or even ‘Luddite’
280 in this regard. Drawing on the work of Webster and Robins (1986) and Bromley
281 (1998), Reid (2009) explored the usefulness of employing a Luddite analysis to
282 generate an understanding of resistance to technology in education. Reid (2009, p.

283 290) suggested that Luddism³ was not a fight against technology *per se* but one
284 against “a particular kind of political economy and ideology...[which] changed the
285 traditional patterns of social life”. Reid argued firstly that Luddism served as a refusal
286 to isolate technology from social relations, and secondly that technological change
287 presented a threat to a particular kind of life. Common populist terms used today to
288 describe opposition or resistance to technologies or technological change include
289 ‘technophobe’, ‘non-techie’, ‘dinosaur’, ‘fossil’ and ‘diehard’. The ‘Luddite’ question
290 arises, therefore: “what changes to the traditional patterns of social life are these
291 modern day Luddites raging against?”

292 It could be argued that, much like most existing continuing professional
293 development (CPD) experiences (Cordingly et al., 2015), the CPD mechanisms to
294 support teachers in using DigiTech in new and pedagogically appropriate ways has
295 been either absent or ineffective. As a result, DigiTech use is driven by so called
296 ‘early-adopters’; innovative, passionate and enthusiastic teachers who are inspired by
297 their personal interest in technologies and their belief that DigiTech can enhance
298 young people’s learning (Casey et al., 2016). The lack of high quality CPD is a
299 problem for these early adopters (lack of critical challenge) as much as it is for the
300 wider Luddite teacher population (lack of knowledge and confidence). Equally, and as
301 we will discuss in the next section, school and classroom contexts are not always
302 conducive to DigiTech use. A lack of support within the local context has long been
303 regarded as a powerful mediating factor in inhibiting teachers’ attempts to change,
304 learn and develop (Fullan, 2015) either with or without CPD mechanisms in place.
305 Perhaps the most effective form of CPD in HPE we could imagine would be where
306 early adopters and Luddites were able to work together within a three-dimensional

³ A member of any of the various bands of workers in England (1811-16) organized to destroy manufacturing machinery under the belief that its use diminished employment. (Dictionary.com)

307 critical, pedagogical and analytical framework. The ambition would be to support
308 both groups to challenge the views of the other, from the starting point that neither is
309 inherently ‘correct’. This type of CPD activity is aligned with the concept of
310 ‘effective’ CPD as proposed by Armour, Quennerstedt, Chambers and Makopoulou
311 (2015) who argued for CPD that allows teachers to focus on complexity, addresses
312 contemporary challenges, bridges research and practice, and nurtures their career-long
313 growth as learners. Yet, as numerous PE-CPD studies have reported (see Parker &
314 Patton, in press) few such opportunities are available. It is difficult to imagine,
315 therefore, how HPE teachers (early adopters and Luddites alike) can currently have
316 the kinds of structured discussions that would support them to use DigiTech in
317 pedagogically sound ways.

318 *Knowledge in Context*

319 In education systems, the “knowledge to be taught, coached or learnt is always a
320 context-bound decision that reflects, reinforces, reproduces (and sometimes
321 challenges) what powerful individuals or groups believes is valuable at any given
322 time” (Armour, 2011, p.13). Considering this point in the case of DigiTech in HPE
323 raises a host of interesting questions about who is driving what. For example, the
324 wider societal context is one where there is an easy of access to mobile health apps;
325 indeed Lupton (2015) puts the figure at over 100,000 such apps available on major
326 app stores and this number is rising all the time. Meanwhile, in HPE, there is a close
327 alignment between the leading HPE physical activity/health discourses (see Gard,
328 2014) suggesting that DigiTech is already driving forms of knowledge that arise in
329 our HPE curricula on health and fitness. Yet, the implications of this trend appear not
330 to have been recognised in formal education policy (see DCMS, 2015 as an example).
331 Moreover, within the local context of schools and teachers’ classrooms, there is little

332 evidence of radical change and innovation driven by technology tools or devices. We
333 do acknowledge that change has occurred i.e. in the expectations that teachers use
334 technologies to provide further understanding of 'learning' in HPE and in the
335 introduction and sustained use of DigiTech such as games analysis, Heart Rate
336 Monitors, pedometers, apps in phones etc. That said, there is evidence to suggest that
337 schools and teachers continue to value traditional sports skills and games (Kirk, 2010)
338 or, in Nordic countries, dance/gymnastics and outdoor activities (Quennerstedt, 2008).
339 Meanwhile, young people are living in a parallel world of DigiTech that promotes
340 views on health and fitness that sometimes accord with – and also challenge – our
341 traditional practices in HPE.

342 At the policy level, the contemporary National Curriculum and Standards
343 operating in a number of countries agree that as a result of a highly effective PE
344 programme, all pupils should be able to lead what they term 'healthy' or 'health-
345 enhancing' lives. Yet, the small number of available analyses on the use of DigiTech
346 in HPE suggests that the forms of knowledge promoted tend to reinforce historical
347 knowledge patterns. For example, DigiTech has been used to promote knowledge
348 about skills and games (see Sinelnikov, 2013) and dance (Öhman et al., 2014). While
349 it has been argued that new models, methods and 'innovative' pedagogical strategies
350 should shift learning away from a focus on specific activities in HPE (O'Sullivan,
351 2013), teachers' personal philosophies, training, and the school context all seem to act
352 to reproduce the traditional activity focus (Kirk, 2010).

353 The pedagogical questions to be asked at this stage, therefore, are about the
354 power of the context to adapt to, adopt or even shape new forms of knowledge that
355 may or may not be positive. There is no doubt that DigiTech is opening up new
356 possibilities and spaces in and through which to learn. If these spaces, however,

357 continue to be constrained by data reporting, limited curriculum opportunities and
358 traditional practices and outcomes, then the best result we can hope to achieve is
359 slightly better solutions to the same problems (Robinson, 2011). Moreover, if teachers
360 are unsupported by appropriate forms of CPD, they will either use DigiTech in
361 essentially uncritical ways that are more informed by technology than pedagogy, or
362 avoid it (Howard & Mozejko, 2015). DigiTech is, after all, only as “good as the
363 pedagogical methods it employs” (Ferster, 2014, p. 176).

364 *Summary*

365 Thus far, we have articulated an apparent disconnect between the debates on
366 the use of DigiTech in education, and questions about pedagogy. Specifically, we
367 have raised concerns about young people’s learning on health through DigiTech
368 *outside* of the school context and the implications for teachers and teaching *within* the
369 school context. We have echoed some of the pessimistic views of Gard, Lupton, and
370 Williamson, while also suggesting that there might be alternative readings of the
371 future of DigiTech in HPE.

372 In the next section, we challenge ourselves and the wider HPE profession to
373 think differently about DigiTech in HPE and we answer our second question: *what*
374 *steps are required to develop new DigiTech pedagogies?* We argue that we need to
375 focus on a complex, multi-layered understanding of pedagogy; i.e. in those places
376 where learning, teaching and context converge- to consider what might be possible for
377 DigiTech in HPE. In other words, as a profession, we argue for the need to engage in
378 ‘blue skies’ thinking and critical yet constructive dialogue to imagine new futures for
379 HPE and the development of new - pedagogies supported by DigiTech - in driving
380 radical change.

381

407 foregrounding the ways in which individual practitioners ‘do’ something
408 pedagogically different with technology. At the same time, and echoing the evidence
409 presented earlier, we concluded that we saw very little in the cases that was genuinely
410 radical or innovative. So, although many practitioners and scholars have positioned
411 DigiTech as a kind of “supertool”, we were struck by the lack of new forms of
412 learning, different types of teaching, or indeed any alternative HPE contexts for
413 learning. What we saw instead was that DigiTech enabled teachers and students to do
414 the same things faster and more efficiently, albeit after some teachers had invested
415 time and effort in learning how to use different technologies. We were left wondering
416 whether what we saw in the cases was the limit of our imagination as a profession.

417 Some extracts from the practitioner reflections in the pedagogical cases are
418 illustrative. Firstly, some teachers were unable to use DigiTech optimally in their
419 practice because there was much they had never had the opportunity to learn – or had
420 even considered as a learning possibility. For example, Dylan reflected “I would be
421 interested in investigating the *lived experience* of students engaged in learning using
422 the iPad” (Goodyear et al, 2016, p. 26). James commented: “Even though I consider
423 myself a reflective practitioner, I had not connected my own professional journey to
424 developments in technology... I have been taken back by the accuracy of the analysis
425 from the academic experts and the amount of theory that highlights how and why
426 these processes occur” (Chambers et al, 2016, p. 63). In another case, Beatrice noted
427 that “in teaching it is important to take a critical look at pedagogies of technology and
428 not think all teaching problems can be solved by technological solutions
429 (Quennerstedt et al, 2016, p. 82) while Andy (Fletcher et al, 2016, p. 118) learnt that
430 changing his mind about using DigiTech in an area of his practice “should not be
431 looked at as a failure but as a strong example of sound pedagogical decision-making”.

432 Indeed, the ambition to learn openly from ‘mistakes’ was a recurring theme. As was
433 noted earlier, some practitioners appear willing to invest significant amounts of time
434 in learning how to use and experiment with different forms of DigiTech, Joey is a
435 good example of this (Gleddie et al, 2016, p. 134) and he was clear that he would be
436 able to learn most effectively where he could share both his successes and his failures:

437 I often share the “best” or in other words the refined or rehearsed
438 version of what actually happened in my class. I receive digital pats on
439 the back for my success, but I do not necessarily grow as a teaching
440 professional as a result. To do that, I need to share the things that did not
441 go as well in lessons and discuss what might have been missed
442 opportunities in my teaching.

443 Secondly, following the practitioner narrative and the analysis from three
444 different disciplinary perspectives, a pedagogy expert was tasked with locating the
445 issues raised in a coherent pedagogical space. Pedagogues, however, struggled to do
446 this in ways that opened up new and innovative pedagogical possibilities. For
447 example, Castelli et al, (2016) drew on the established theories of problem-based
448 learning as an analytical framework, Jones et al, (2016) (amongst others) used
449 TPACK, Enright et al (2016) focussed on the privatisation of physical education –
450 although they also include a section on ‘re-imagining’ HPE, and Armour et al
451 (2016) drew on narrative theory and Deweyian concepts.

452 What we learnt through the process of constructing pedagogical cases,
453 therefore, is that defining pedagogies of technology was helpful in framing the task
454 for the pedagogical case author teams and encouraging them to think innovatively.
455 Yet, the cases revealed remarkably little practice that could be regarded as radical as a
456 direct result of using DigiTech to support learning. Instead, we have come to the

457 conclusion that while DigiTech should be able to “deepen and accelerate learning”
458 (Fullan, 2013b, p 28) and enable teachers to do things “differently”, we have missed
459 out the prior-step of clarifying what is meant by “accelerating” learning in HPE, and
460 *doing* things “differently”. Essentially, the question for the profession is: what can we
461 imagine for HPE?

462 Reflecting on the pedagogical cases process, we are able to offer a brief
463 example of how an understanding of the benefits of DigiTech might be enhanced by
464 pedagogical analysis. We draw again on the pedagogy framework of learners and
465 learning, teachers and teaching and knowledge in context (Armour, 2011) mentioned
466 earlier. In their pedagogical case chapter, Quennerstedt et al. (2016) used Armour’s
467 framework to consider Béatrice’s use of dance video games in her teaching.
468 Quennerstedt et al. (2016) argued, from a *learners and learning* perspective, that the
469 key is not to consider how students are learning but *what* they are learning. They
470 posed the question: “is the aim to learn different movement qualities, a particular
471 dance, rhythm, dance moves, creativity, biomechanical or physiological principles?
472 (Quennerstedt et al., 2016, p. 79). From this perspective, DigiTech is not a “gizmo”
473 but a pedagogical intent to help learners learn. Secondly, in focussing on *teachers and*
474 *teaching*, Quennerstedt et al. (2016) concluded that Béatrice used DigiTech as a
475 teaching *resource* and emphatically not as a substitute teacher. Thus, the dance video
476 game was described as “an instructor, a source of inspiration and a resource for
477 students”(p. 79). In their consideration of *context*, Quennerstedt et al. (2016)
478 challenged the reader to contemplate, from a cultural, historical and subject area
479 perspective, why dance is taught at all; for example, is it “an activity, a cultural form,
480 a form of exercise or an aesthetic practice and expression?” (p. 80). This level of
481 analysis offers rich possibilities for teacher learning in CPD.

482 The remaining task for this paper, therefore, is to provide the rationale for our
483 claim that we need to open a profession-wide debate about the nature of radical
484 pedagogies in HPE that make optimal use of the potential capacity of DigiTech while
485 minimising the potential harms. Looking back to earlier sections of this paper, a
486 useful starting point is Lupton’s (2015, p. 127) question:

487 How far are we from a situation where “students are forced to wear
488 heart-rate monitors to demonstrate that they are conforming to the
489 exertions demanded of them by the HPE teacher?”

490 An immediate reaction might be negative, given the dangers posed by a
491 growing focus on performativity as outlined by Gard (2014) and many others in our
492 field (Enright et al. 2016; Gleddie et al, 2016) and within education more broadly
493 (Apple, 2007). There might, however, be another response.

494 In their individual and collective arguments about DigiTech, Gard, Lupton and
495 Williamson suggested that DigiTech could offer more personalised and individualised
496 learning opportunities. Building on this view, and using Lupton’s example above of
497 the heart rate monitor, we would like to argue that teachers could use DigiTech to
498 monitor and tailor ‘physical exertions’ to the individual student and that this might be
499 a very good thing. Indeed, it might be a better pedagogical strategy based on accurate
500 individualised data that allows teachers to better meet the needs of each student.

501 Although Gard, Lupton and Williamson suggested that such an approach could work
502 to drive school improvement to the *exclusion* of teachers, it could also be argued that
503 in the hands of skilful teachers, good data could be used to drive new and better forms
504 of learning in HPE. Certainly, Hattie (2012, 2009), among others (e.g., Dinham,
505 2013) have argued that teachers who have the greatest impact on learning are those
506 who can accurately diagnose and plan for the learning needs of their students. The

507 better the quality of the information a teacher has about a student, the more effective
508 their pedagogies are likely to be. From this perspective, DigiTech has the potential to
509 be an invaluable pedagogical device to support learning in individually and
510 developmentally appropriate ways.

511 The problem, at this stage, is that we have not had a grand profession-wide
512 debate that could inform our decisions about the use of DigiTech in HPE and its
513 potential to change our practices for the better. A ‘profession-wide’ debate is not one
514 that can rage in the pages of academic journals read mainly by other academics
515 (Sandaña, 2014). As Sandaña (2014) suggests, if we keep doing this we will keep
516 recycling the message of, “I got a different way of lookin’ at it”, and, in turn, the same
517 pedagogical practices will most likely continue to exist. Instead, we ‘all’ need to
518 ‘jump on’ the enthusiasm that DigiTech has in young people’s lives and begin to co-
519 construct new and exciting futures for HPE.

520 A profession wide debate would involve policy makers, businesses, health
521 professionals, technology experts, teachers, students, parents, and the wider
522 community. In other words, anyone who is a participant in, or invested in HPE. We
523 know from existing evidence-base that exercising the voices of all key stakeholders in
524 HPE is a powerful mechanism for diagnosing learners’ needs, evaluating teachers and
525 teaching, co-constructing new contexts for learning and creating effective practices
526 within HPE (see Leatherdale et al., 2015, and Luguetti et al., 2015). We have been
527 sensitised to the dangers of DigiTech in HPE by the ground-breaking work of Gard,
528 Lupton, and Williamson yet, at the same time, their pessimistic views are somewhat
529 ‘zoomed out’ from the realities of young people’s digital lives. We have learnt from
530 the pedagogical cases process that new futures are possible for HPE, but that the
531 collaborations we facilitated between academics and practitioners highlighted a lack

532 of radical change in HPE. By opening these debates and questions about co-
533 constructing new forms of HPE within the social and cultural framework of DigiTech,
534 to a wider audience, however, we might generate discussions that can lead to
535 improvements to HPE.

536 We conclude this paper by drawing on Veletsianos (2016) to suggest that a
537 focus on “emerging technologies” and “emerging practices” in digital learning could
538 be a useful way forward. As Veletsianos (2016) argues, “emerging technologies” and
539 “emerging practices” transcend disciplines and, moreover, what makes practice and
540 technology emerging is not the technology, but rather the environments in which
541 technologies and practices operate. Emerging technologies and practices, therefore,
542 are foregrounded in the belief that technologies and practices shape and are shaped by
543 sociocultural environments. Another notable characteristic of emerging technologies
544 is that while there is significant potential for change, such potential has not yet been
545 realised. This final characteristic is the key message of this paper. The ‘take home
546 message’ we want to provide is that DigiTech crosses multiple sectors (e.g.,
547 education, journalism, sport), multiple contexts (e.g., home and school), and can be
548 used in multiple ways (e.g., improve learner-learner interaction or personalised
549 learning). As an academic profession, therefore, we will do our young learners a
550 disservice if we simply subscribe to a pessimistic view of the role of DigiTech in HPE.
551 As Veletsianos (2016) argues, DigiTech is not yet established in education. This
552 provides an opportunity for pedagogy experts to shape debate, pedagogy and practice
553 around DigiTech in HPE, rather than allowing technology experts to claim the
554 territory.

555

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