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Quality and Health-Optimizing Physical Education:

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DOI:

[10.1123/jtpe.2016-0075](https://doi.org/10.1123/jtpe.2016-0075)

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Document Version

Peer reviewed version

Citation for published version (Harvard):

Dudley, D, Goodyear, V & Baxter, D 2016, 'Quality and Health-Optimizing Physical Education:: Using assessment at the health and education nexus' *Journal of Teaching in Physical Education*, vol 35, no. 4, pp. 324-336. DOI: 10.1123/jtpe.2016-0075

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Quality and Health-Optimizing Physical Education: Using assessment at the health and education nexus

Abstract

Background: The United Nations Educational, Cultural and Scientific Organization (UNESCO) recognises quality physical education (QPE) must, along with physical, social and affective educative goals, seek to improve the health status of youth (UNESCO, 2015). Health-Optimizing Physical Education (HOPE) is a model of physical education (PE) that seeks this goal but is creating much debate in the discipline (Sallis et al, 2012).

Purpose: The aim of this paper is to present a conceptual assessment framework for QPE and HOPE on which future assessment protocols may be based that serve both health and educative goals.

Methods/Data analysis: Policy and literature pertaining to QPE and HOPE were reviewed and compared for similarities and differences. This was followed by an analysis of literature on assessment in the health and education disciplines. These analyses provided the authors with the insight to propose a new model of assessment for HOPE models in order to implement QPE.

Results: Many similarities exist in the policy of QPE and the published literature on HOPE. However, the measurement model of assessment can often circumvent two important assessment functions for education settings that need to be addressed in a wider QPE and Models-Based Practice (MBP) context.

Conclusions: HOPE models were established using an interventionist mindset and are therefore well suited to integrating well-defined MBP pedagogies as appropriate ‘intervening’ strategies by using a clinical approach to teaching and assessment. To date, they have lacked an assessment framework that has been capable of addressing both the health and educative goals that both HOPE and MBP seek to achieve. This paper provides new insight by reimagining the role MBPs and assessment practices have to play in the health and education nexus.

Introduction

27 It is widely accepted that regular participation in physical activity is an essential component
28 of a healthy lifestyle (Biddle, Gorely, & Stensel, 2004). Despite this recognition, studies of American
29 (Pate et al., 2002), European (Currie et al., 2004) and Australian (National Heart Foundation and
30 Cancer Council, 2011) show that considerable proportions of youth do not meet their national
31 physical activity guidelines for daily physical activity. However, the public health concerns of
32 physical inactivity in youth are just one of the many priorities of PE curricula. To address this public
33 health concern with competing educative goals, the United Nations, Educational, Scientific, and
34 Cultural Organization (UNESCO) released their Quality Physical Education (QPE) Guidelines for
35 Policymakers monograph (UNESCO, 2015). The UNESCO monograph makes a serious policy
36 attempt of combining both public health goals and educative goals for PE. The document stressed that
37 rising levels of physical inactivity and the substantial increase in associated non-communicable
38 disease warrant governments to take substantial action to ensure that physical education positively
39 influences health. This contribution of physical education as an influential entry point to physical
40 activity and health promotion has received increasing scrutiny from researchers in recent years (Cale,
41 Harris & Chen, 2014; Cale & Harris, 2011; Dudley et al, 2011; Haerens et al., 2011; Quennerstedt,
42 2011). Although there have been significant political and empirical efforts to improve physical
43 activity experiences for youth (see Armour & Harris, 2013), a worldwide report compiled by
44 Hardman, Routen, and Tones (2014) on the state of physical education suggests otherwise. They state
45 there continues to be a steady erosion of QPE programs in schools with many curriculum programs
46 having limited impact on increasing young people's levels of physical activity.

47 The aspiration of the UNESCO QPE guidelines, like many other initiatives, is to ensure
48 physical education secures a rightful place in school curricula (Kirk, 2010; UNESCO, 2015).
49 Specifically, the QPE guidelines set out to address the cognitive, affective and psychomotor elements
50 of learning in order for youth to be capable of living a healthy active life (UNESCO, 2015). This
51 however, is not a new proposition. This perspective of physical activity for health is inculcated within
52 the key underpinnings of most PE pedagogical (or instructional and curricula) models and models-
53 based curricula (Haerens et al., 2011; Kirk, 2013; Metzler, 2011). While also inclusive of the social

54 domain - which Casey & Goodyear (2015) argue is necessarily distinctive to the affective – PE
55 pedagogical models seek to promote physical, cognitive, social and affective outcomes by providing
56 teachers with ‘design specifications’ (Kirk, 2013, p. 979) for organizing teaching, learning and
57 content material. Separate reviews of literature have confirmed that PE pedagogical models can
58 positively influence the physical, cognitive, social and affective learning of youth (see for detail,
59 Casey & Goodyear, 2015; Harvey & Jewett, 2014; Hastie et al., 2011). As a result, many now argue
60 that PE pedagogical models offer a legitimate pedagogical or ‘curricular scaffolding’ (Ennis, 1999)
61 necessary to improve the quality of physical education and, subsequently, enhance young people’s
62 health-related physical activity behaviours (Metzler, 2011).

63 Despite a growing consensus surrounding PE pedagogical models and their alignment with
64 government aims and strategies for learning in physical education (see for example, UNESCO, 2015),
65 in practice and policy the use and promotion of quality PE models is not widespread (Casey, 2014;
66 Kirk, 2013). Running parallel to research around PE pedagogical models is how teachers diagnose the
67 health-related learning needs of their students and how ‘we’ capture the effect teachers’ practices and
68 pedagogies have on the health-status of youth (Armour & Harris, 2013; Puhse et al., 2011).

69 Health effects in physical education are predominantly captured through health-related
70 assessments (e.g. fitness tests, body composition assessments, pedometer counts, etc...) which can
71 lead to inappropriate judgments being made about teachers’ practices and the health capacity of youth
72 (Cale, Harris & Chen, 2014; Macdonald, 2011; Keating & Silverman, 2009). Whilst these types of
73 assessment can contribute to understanding of health behaviours, they often fail to account for
74 learning across all four domains as they focus primarily on the physical (Cale & Harris, 2011; Cale,
75 Harris & Chen, 2014; Haerens et al., 2011) and may neglect the complex, diverse and individual
76 needs of young people (Armour, 2014). The purpose of this paper is to present an assessment
77 framework for Health Optimizing Physical Education (HOPE) and other Models-based practices
78 (MBPs) as a means to support the development of QPE.

79

80 In the following section, we use the Health Optimizing Physical Education (HOPE) Model to
81 show how a model that aligns closely with the stated goals of QPE is restrained by current health
82 assessment practices. Following this we provide a justification for a new type of assessment
83 framework in PE that seeks to support teachers addressing and developing physical, cognitive, social,
84 and affective health-related learning behaviours across a continuum of diverse and individual learning
85 needs. Finally, we consider how this framework and any number of PE pedagogical models can be
86 ‘Health Optimizing’ and hence used by teachers to support the promotion of health in a clinical
87 teaching framework.

88 **Health Optimizing Physical Education (HOPE): An opportunity for QPE**

89 In 2012, Sallis and colleagues replaced the “health-related physical education” term they
90 introduced in 1991 with “health optimizing physical education” or HOPE (Sallis et al, 2012). As in
91 the QPE guidelines (UNESCO, 2015), HOPE identifies PE as the entry point of lifelong participation
92 in physical activity and therefore a major contributor to the public health agenda. HOPE seeks to
93 provide students with the knowledge, skills, abilities, and confidence to be physically active for life in
94 a learning environment that itself promotes physical activity participation. Essentially, the HOPE
95 model makes the same assertions as UNESCO (2015) in that other important PE goals (such as
96 physical, social, cognitive and affective learning goals) are achieved through and in a physical activity
97 context (Sallis et al, 2012). They proposed defining HOPE as a model of PE that encompasses
98 context, curriculum and teaching designed to achieve several objectives: health-related physical
99 activity; keeping students active during lesson time; engaging all students regardless of their physical
100 ability; and significantly contributing to students’ overall physical activity participation, thereby
101 improving their health. Specifically, the HOPE model advocates a goal of providing moderate to
102 vigorous physical activity (MVPA) for 50% of PE class time.

103 According to Sallis et al (2012) adopting a health optimizing approach to PE does not mean
104 abandoning all other physical education goals, but ensuring that teaching towards health goals are
105 prioritised in the PE lesson. This overt prioritization of health goals ahead of educative goals that may
106 be preventing HOPE from being more widely used by education systems as a model of QPE. Some

107 researchers have actually argued that the educative goals (measured by achievement of learning
108 outcomes) and public health goals (measured by improvement in health indices) are dichotomously
109 opposed (Armour & Harris, 2013; Macdonald, 2011; Tinning, 2015) leaving the notion of what
110 constitutes a QPE experience for students being highly contested. Moreover, this makes measures of
111 model effectiveness complex and difficult to track.

112 Although some organisations may have embraced HOPE because it aligns with the guidelines
113 now endorsed by the Centres of Disease Control and Prevention (2011) as key components of a
114 Comprehensive School Physical Activity Program (CSPAP) (Metzler et al, 2013) few education
115 institutions have done so. Conversely, other pedagogical models that prioritize educative goals – such
116 as Sport Education, Cooperative Learning, or Teaching Personal and Social Responsibility - have also
117 failed to be adopted widely in PE practice and by public health agencies (Kirk, 2013). The failure of
118 public health and education institutions to synergise in this agenda and successfully implement QPE
119 programs that can achieve both health and educative outcomes is of growing concern and quite a
120 paradox. In using HOPE as an example of QPE, we have been able to highlight the notable absence of
121 the HOPE approach to speak a common language that exists in both the health and education
122 disciplines.

123 The inability for people from different disciplines to work together to consider effective
124 interventions and PE pedagogical actions for young people in schools continues to be a problem for
125 our field (Armour, 2014). Most education and health systems have struggled to find the balance
126 between addressing the public health imperative of PE with the educative imperative of learning
127 (Armour & Harris, 2013). Teachers and schools are expected to address public health concerns in a
128 population whilst simultaneously struggling for time in an ever-crowded school curriculum that
129 values ‘intellectual’ achievement ahead of an individual’s health status (West, Sweeting & Leyland,
130 2013). This in fact, creates a false dichotomy that education of the mind and education of the body in
131 some way different or separate (Kirk, 1996; Whitehead, 2010).

132 Despite this impasse, the intimate link between health and education status is well cited in the
133 empirical literature (Ross & Wu, 1996; Cutler & Lleras-Muney, 2006). Whilst the direction of

134 causality in this relationship between health and education remains fiercely debated, accepting that
135 both disciplines are interrelated allows researchers to work toward identifying why the health and
136 educative nexus has been difficult to achieve. The role assessment plays in achieving this nexus is less
137 researched and we argue is worthy of further investigation. Indeed, the focus on teaching in a physical
138 activity medium rather than diagnosing and assessing the learning needed to be physically active may
139 in fact be a key to driving and instigating a wider adoption of the HOPE model in educative settings.
140 Armour and Harris (2013) and Armour, Makopoulou and Chambers (2012) have argued that
141 diagnosing the learning needs of young people first should drive the entire pedagogical process and it
142 is this lack of attention to this diagnostic process that is a key contributing factor to the reported low
143 levels of physical activity engagement in the adult population. In QPE and HOPE, like any other
144 concept in education, there needs to be a shift from an over reliance on simply providing ‘success’
145 experiences and judging against nebulous ‘standards’ (Masters, 2013). We need assessment
146 instruments and teaching practices that focus on ‘growth over time’ and are evolutionary in their
147 capacity to capture learning. These assessment instruments then need to be coupled to a teaching
148 model that does not see pedagogy employed by ‘educationalists’ and ‘interventionists’ as the
149 dichotomy described by Tinning (2015). Rather, attempts to understand the differences between
150 interventionist research and the pedagogy of educationalists (regardless of MBP employed) are
151 mutually beneficial in addressing the public health and educative nexus sought by any model claiming
152 a QPE mandate.

153 **Moving forward - assessing at the health and education nexus**

154 If assessment is positioned to address both health and educative goals, there also needs to be
155 an understanding of ‘student growth’. Student growth simply refers to how much a student’s learning
156 has grown over any given period.

157 In many PE curricula and models, the focus can tend to be on narrow or nebulous standards
158 and measurements without context, as evidenced through standardised educative or health testing
159 regimes, and hence ignore the important measure of growth. Students may meet or exceed the
160 ‘standards’ set for their age, but their learning may not have sufficiently grown over their last year of

161 schooling. We argue for a shift in focus to growth AND standards in any QPE and HOPE model. Our
162 emphasis should be on assessment for learning, which is the means by which teachers can focus on
163 and measure student growth; that is, devising assessment that assists teachers to make decisions about
164 the optimal pedagogy appropriate for their students during PE.

165 Goodyear and Dudley (2015) recognised that effective PE teachers play an active role in the
166 teaching and learning process. They create a learning environment that promotes student learning with
167 their peers. Even in ‘student-centred’ MBP, teachers interact with students, not only when students
168 reach a barrier in their learning but to interpret, understand, support, and develop the learning that is
169 taking place. Effective PE teachers need to constantly diagnose what is occurring during the lesson,
170 have multiple interactional strategies (that include multiple MBP approaches), and evaluate (assess)
171 the impact of these actions on student learning (Goodyear & Dudley, 2015).

172 At the centre of Goodyear and Dudley’s (2015) argument is the learner and an assessment of students’
173 learning needs. This argument is in agreement with Armour and colleagues’ discussions around
174 effective pedagogies and pedagogies for health, termed ‘PE-for-health’ pedagogies (Armour, 2014;
175 Armour & Harris, 2013; Armour et al., 2012), and Hattie’s (2012) discussions around visible learning.
176 As Armour and Harris (2013) suggest, models and proposals for health pedagogies have suffered
177 weaknesses and have failed to be adopted because they have not had the vested interests of the clients
178 – i.e. the children – at the heart of the pedagogical encounter. To ensure teachers have maximum and
179 positive impact on children’s health the diverse and individual needs should be at the centre of
180 practice and, therefore, the starting point for an effective pedagogy is the student and the ongoing
181 assessment of students’ learning needs (Armour, 2014; Armour & Harris, 2013; Armour et al., 2012).
182 Equally, Hattie (2012) has argued that the pedagogical encounter should begin with an identification
183 of students targeted learning needs that involves identifying (i) learning intentions for students and (ii)
184 success criteria. Through this diagnostic approach, teachers can use the framework provided in this
185 paper to address their students diverse and individual needs but also determine the level of impact
186 their practices have on their students’ learning. While we, as authors, agree with these arguments, as

187 Puhse et al. (2011) argued, a framework to support teachers assessing learning and the impact they are
188 having or have had on students' health is missing in the field.

189 **Building an assessment framework that can serve both educative and public health needs**

190 If QPE models (including HOPE and other MBPs) accept their capacity to achieve both
191 health and educative goals, the role of the assessment framework within these models needs to be
192 considered as assessment always becomes the enacted curricula (Biggs, 1999). Effective frameworks
193 of assessment need to be grounded in defensible models of metacognition and observable learning
194 (Biggs, 1999). Unfortunately for PE, popular metacognitive models in education, such as Bloom's
195 Taxonomy of Learning Objectives (Bloom, 1956) and the later revisions by Anderson et al (2005)
196 were primarily concerned only with the cognitive domain of learning. Even though adaptations were
197 constructed for the affective (Krathwohl et al, 1973) and psychomotor domains (Simpson, 1972), they
198 remained beleaguered by a lack of empirical support as to their validity and reliability at
199 distinguishing between the learning domains, confusion with levels of knowing and forms of
200 knowledge, and endemic semantic misinterpretations when used by teachers (Colder, 1983; Hattie &
201 Purdie, 1998).

202 In order to describe the progression of increasing cognitive, affective, social and psychomotor
203 complexity for QPE and HOPE being outlined in this paper, a tool was sought that was not limited to
204 any one of the aforementioned learning domains. The selected learning model had to be capable of
205 addressing all four learning domains simultaneously AND be observable in a physical activity
206 medium if the claim that QPE and HOPE could achieve both educative and public health outcomes is
207 to be sustained. For this reason, within each domain of learning (Figure 2) is an embedded dissection
208 of observed learning behaviors using the Structure of Observed Learning Outcomes (SOLO)
209 taxonomy proposed by Biggs and Collis (1982).

210 The SOLO taxonomy was used in this framework to understand the learning complexity of
211 QPE and HOPE because it has been used to effectively measure levels of conceptual understanding
212 across a wide range of subject areas, including PE. The SOLO taxonomy is based on neo-Piagetian

213 descriptions of learning and was constructed by Biggs and Collis (1982) through detailed observations
214 of the developmental pattern of student behaviors and responses in relation to assessment tasks in a
215 wide variety of school subjects in both the humanities and scientific disciplines (Biggs & Collis,
216 1982). It has been used since 1982 to assess levels of student performance in subjects as diverse as
217 undergraduate science education (Newton & Martin, 2013), secondary science (Soobard & Reiska,
218 2015), statistics (Nor & Idris, 2010), dental education (İlgüy, İlgüy, Fişekçioğlu & Oktay, 2014), pre-
219 service education in mathematics (Özdemir & Yildiz, 2015) and literary studies (Svennson,
220 Manderstedt & Palo, 2015). Most significantly for this project, SOLO has been used to measure
221 teacher understanding of PE pedagogy and to assess student understanding of concepts related to PE
222 (Baxter & Dudley, 2008; Dudley & Baxter, 2013; 2009; Dudley, Drinkwater & Kelly, 2014). Haynes
223 (2009) also showed that SOLO cycles of learning could be applied to the sensorimotor mode of
224 learning, notably in the performance of gymnastic-type movements. Most recently, Dudley (2015)
225 applied the SOLO taxonomy to a Conceptual Model of Physical Literacy. The SOLO-based
226 assessment rubric described by Dudley (2015) catered for guiding simultaneous assessment of school-
227 aged youth across four core domains of physical literacy. Each of these four core elements addressed
228 interpretations of numerous pedagogical models across the cognitive, affective and psychomotor
229 domains of the PE discipline. What makes application of the SOLO Taxonomy most appealing for
230 addressing the educative and public health nexus of QPE and HOPE is that it has been evaluated as
231 particularly applicable to the measurement AND categorization of standards at different levels of
232 conceptual understanding (Boulton-Lewis, 1998; Chan et al., 2002; Hattie & Brown, 2004).

233 The SOLO taxonomy (Biggs & Collis, 1982) describes five levels in the learner's
234 development of deep conceptual understanding of a construct. These levels are:

- 235 1. Prestructural (Limited or no understanding)
- 236 2. Unistructural (Understanding of one element)
- 237 3. Multistructural (Understanding of a number of elements but not the pattern of relationships between
238 them)

- 239 4. Relational (Understanding of the links between the elements and the ability to describe the
240 elements as a whole – pattern recognition)
- 241 5. Extended Abstract (The ability to relate and apply the concept to other contexts and other concepts
242 – critical evaluation).

243 Viewed thus, the SOLO taxonomy can be seen ‘to chart the growth’ of student learning from
244 surface to deep understanding. A feature of this progression is that from one level to another may be
245 marked by transitional stages in which a student may exhibit both an upper and lower level in the
246 same assessment artifact. Biggs and Collis (1982, p. 217) also maintain that SOLO levels were
247 discernible in the Piagetian modes (sensory-motor, intuitive, concrete symbolic and formal) which
248 means they can be expressed across the spectrum of learning undertaken during all years of schooling
249 (i.e. from pre-school to tertiary education).

250 The SOLO taxonomy provides a well-evidenced (Killen, 2005) and applied learning model
251 that informs the dominant pedagogical approach of constructive alignment (Biggs, 1999). Hattie
252 (2009) states that the most effective teachers are able to see through the eyes of their students
253 therefore by focusing on ‘observed’ outcomes, teachers are able to reduce the risk of nebulous or
254 overly narrow standards infiltrating their judgments of student learning and physical activity behavior.
255 In other words, the application of SOLO taxonomy should serve to empower teachers and students to
256 view the educative goals of PE in any physical activity context.

257 **Applying a SOLO derived assessment framework to QPE and HOPE**

258 The development of an assessment framework based on the taxonomy described within this
259 paper should enable teachers to begin the informed development of assessment instruments to be used
260 in the assessment of QPE and HOPE programs in schools. These instruments should be used to
261 determine the progress students make based on varied starting points in any given physically active
262 learning context over time.

263 Figure 1 is a suggested multi-learning rubric to be used as an assessment framework for the
264 design of assessment instruments in QPE and HOPE programs. On the vertical columns, the SOLO

265 Taxonomy is articulated as presented by Biggs and Collis (1982). On the horizontal rows, the rubric
266 exemplifies that physical activity is used as a medium to observe student behavior in order to infer
267 cognitive, affective, social and psychomotor achievement. This notion of observed learning by a
268 teacher in a physical activity medium is known as assessing ‘legitimate manifestations of learning’ as
269 described by Dudley (2015) and supported by Goodyear and Dudley (2015) in an active learning
270 environment. Ensuring that physical activity remains the focused context in which assessment occurs,
271 allows the proposed assessment framework in Figure 2 can serve the simultaneous health and
272 educative goals of QPE and HOPE.

273 It is however important to note, that the primary goal of the HOPE model was to increase the
274 amount of MVPA accrued during PE classes (Sallis et al, 2013). The assessment framework proposed
275 in Figure 2 suggests a new lens in which to envisage physical activity within the PE class. An addition
276 to the Sallis et al (2012) premise that accrument of MVPA minutes is important for health goals, We
277 propose that this alone negates the fact that as learning improves, quality as well as quantity of
278 physical activity should manifest. Assessing physical activity in this light allows for greater
279 pedagogical liberty at the health/education nexus in PE. Teachers can legitimately defend that the
280 learning that occurs during a PE lesson can be exhibited as a quantifiable measure (i.e. MVPA
281 minutes) or a qualitative measure (i.e. efficiency of movement, refined skill execution).

282 It also encapsulates a ‘growth’ mindset approach to student assessment. As previously
283 discussed, this is a consistent limitation of both standards and measurement models in PE seeking to
284 achieve public health and educative goals. The approach demonstrated in this rubric permeates the
285 constraints of any given chronologically-derived curricula in favor of identifying points in the
286 learning experience whereby curricula context or complexity must evolve in order for student learning
287 to progress. This is identified in the rubric as the ‘*Progression Threshold*’. The adoption of a
288 ‘*Progression Threshold*’ was consistent with contemporary iterations of the SOLO Taxonomy
289 described by Pegg and Panizzon (1997) and later by Dudley and Baxter (2009). The reason for this
290 ‘*Progression Threshold*’ is that it indicates a point in the learning progression whereby a student’s
291 learning is likely to move to new conceptual understanding of the context. Unlike previous published

292 literature though, this assessment framework explicitly states that it is the context of physical activity
293 that needs to change to ensure that an increase in learning and potential health efficacy can occur.

294 It should be noted that very few students will actually progress to the Extended Abstract level
295 in any given task but being consistent with adopting a ‘growth’ mindset, teachers also need to be able
296 to capture this exceptional learning when it occurs. It is likely to result in a significant paradigm shift
297 in the way in which students think, act or feel about their physical selves (Dudley & Baxter, 2009;
298 2013).

299 The power of applying this framework is to direct the discussion and thinking of teachers,
300 students, and health policy makers to knowing about what students think, do and feel (Hattie & Yates,
301 2013). Once this becomes the discussion among these key stakeholders in public health and
302 education, they may then focus their efforts on making students aware at the start of any given
303 physical activity experience what success is expected to look like (based on appropriate level of
304 challenge) and then engaging them in the challenge to achieve that success (Hattie & Yates, 2013).

305 In QPE and HOPE, like any other concept in education, there needs to be a shift from an over
306 reliance on simply providing ‘success’ experiences and judging against nebulous ‘standards’
307 (Masters, 2013). We need assessment instruments and teaching practices that guide teachers to focus
308 on students learning needs, support teachers in identifying students’ learning needs, focus on ‘growth
309 over time’ and are evolutionary in their capacity to capture learning. This needs to be coupled by an
310 approach to teaching that does not see pedagogy employed by ‘educationalists’ and ‘interventionists’
311 by as the dichotomy described by Tinning (2015). Rather, attempts to understand the causality of
312 interventionist research and the pedagogy of educationalists are mutually beneficial in addressing the
313 public health and educative nexus sought by QPE and HOPE. As discussed earlier in this paper, this
314 segregation cannot exist if educative and public health goals are going to be achieved.

315 **Case studies of application**

316

317 Figures 2 and 3 are two hypothetical case studies of how the proposed assessment framework
318 might shape a teachers' thinking in applying this type of HOPE model assessment practice. "James"
319 in Figure 2 is a student participating in a soccer-based unit within his PE lessons. At the beginning of
320 the unit, he demonstrates Unistructural manifestations of cognitive, social, affective and psychomotor
321 learning when presented with the physical activity context of soccer. As the unit progresses, his
322 cognitive, affective and psychomotor learning begin to exhibit as Multistructural behaviours. In other
323 words, he is solving simple tactical problems in the game (like passing to beat opponents), and can
324 now complete many of this skills unassisted. His social learning development however remains stalled
325 as he will not encourage other teammates during the games or shake hands with his opponents at the
326 conclusion of the game. The physical activity that manifested during this assessment period for James
327 was improved quality of physical activity that manifested as a more efficient passing technique and an
328 increase in time in possession of the ball if he steals possession, but a reluctance of teammates to
329 share with him. Quantity of physical activity is evidenced by an increased MVPA minutes during the
330 unit and his increased intensity of PA during the same period. Given this lack of social growth in
331 James during this unit, the teacher knows to present a pedagogical intervention that promotes greater
332 emphasis on his social development in this physical activity context.

333 Katie (Figure 3), like James in Figure 2, she too is a student participating in a soccer-based
334 unit within her PE lessons. At the beginning of the unit, she too demonstrates Unistructural
335 manifestations of cognitive, social, affective and psychomotor learning when presented with the
336 physical activity context of soccer. As the unit progresses though, she reaches a cognitive
337 understanding at a Relational level whereby she can applies different tactical and problem solving
338 decisions to adapt her performance to changing rules/instructions and demonstrates a capacity to
339 develop strategy to improve her efficacy in successive lessons. The quantity of physical activity is
340 evidenced by her progression would be an increase in MVPA minutes during the unit and his
341 increased intensity of PA during the same period. However, the quality of the physical activity she
342 exhibits surpasses that of James. Not only is she more effective at the same techniques and has
343 increased time in possession, her increase in social development results in teammates sharing the ball

344 with her more often. Her ability to solve operate cognitively at the relational level during the soccer
345 unit means that if further growth in this domain is going to occur, the intensity or complexity of the
346 unit will need to increase. It also indicates to the teacher that the pedagogical focus for this student
347 needs to be directed to the other three learning domains for this student.

348 **Identifying a place for the QPE/HOPE assessment framework – Practical teacher applications**

349 Teachers should use this QPE/HOPE framework presented in Figure 1 to shape their thinking
350 in the whole design of their PE programs. To do so effectively requires positioning the framework
351 within a basic model of an aligned PE curriculum. The main theoretical underpinning of standards or
352 outcomes-based curriculum is the model constructive alignment (Biggs, 1999). John Biggs defines
353 this as coherence between assessment, teaching strategies and intended learning outcomes.

354 At its most basic, the model requires alignment between the intended learning outcomes, how
355 the student is assessed, and what the student does in order to learn. The following is a practical ‘step
356 by step’ guide for teachers to use in their application of this QPE/HOPE assessment framework.

357 **Step 1:** Identify the intended learning outcomes of your PE curriculum – The standards or
358 outcomes come first and allow the teacher to refine the assessment framework into an
359 effective instrument.

360 **Step 2:** Use the QPE/HOPE assessment framework as the regime in which the learning
361 activities are organised that will teach the students how to meet the assessment criteria (and
362 hence, reach the standards/outcomes). Each of the criteria from the framework can be
363 extracted and contextualised into an assessment instrument whereby social, affective,
364 cognitive and psychomotor are assessed simultaneously. Furthermore, physical activity (both
365 quality and quantity) remain an underlying imperative of the expected behaviour in a PE
366 curriculum. Figure 4 is an example of how a teacher might extract a PE standard/outcome and
367 apply it to the QPE/HOPE assessment framework as a usable assessment instrument. The
368 example outcomes have been extracted from the New South Wales Personal Development,
369 Health and Physical Education Curriculum (BOSTES, 2003). For optimal effect, the

370 instrument should be administered both formatively and summatively to ascertain student
371 growth.

372 *Step 3:* What the teacher does and what the students do are aimed at achieving the outcomes
373 or standards by meeting the assessment criteria. This takes advantage of the numerous MBPs
374 that PE teachers can draw on as intervention strategies in tackling the diverse nuance of PE
375 curricula standards/outcomes.

376 *Step 4:* Review student achievement across the designated PE program based on the criteria
377 and return to Step 1 by selecting the next standards/outcomes from the PE curriculum to be
378 assessed.

379 **Achieving the health/education nexus via assessment**

380 HOPE curricula were established using an interventionist mindset and are therefore well
381 suited to integrating their well-defined pedagogies (including other MBPs) as appropriate
382 ‘intervening’ strategies within this assessment framework. To date, they have lacked the rigor of an
383 assessment framework and an integrated teaching model that has been capable of addressing both the
384 health and educative goals they seek to achieve. Moreover, these curriculum designs have largely
385 bypassed the teacher and students’ learning needs. The assessment framework presented in this paper,
386 therefore, serves to help teachers in the process of diagnosis, the subsequent design or selection of
387 appropriate pedagogical models or strategies, and finally, an evaluation of the impact of their practice
388 on students’ learning. We HOPE that this paper provides new insight in how that gap may be reduced
389 by reimagining the role a QPE program can to play in improving both the health and education within
390 their communities. We would also like to think that while here is a focus on HOPE models of PE, this
391 framework could be useful for any existing MBP.

392 **Limitations**

393 There are numerous limitations with this paper given its conceptual approach to tackling a
394 persistent and divisive topic in health and education. This paper did not attempt to tackle issue
395 regarding the definitions of health or interpretations of it within the two disciplines and we

396 acknowledge that views on health ‘all depend on your health perspective’ (Quennerstedt, 2011, p. 46).
397 There also needs to be an acknowledgement of the challenges teachers encounter in supporting health
398 goals in an educative institution. These cultural and political barriers are real in the day to day lives of
399 teachers and students and ultimately narrow the capacity of teachers and schools to consider such
400 radical reform. Despite all of this, it is the HOPE of the authors that this is a starting point for
401 further debate and discussion on how to support, develop, and improve young people’s experiences of
402 physical education.

403 Note on authorship: As noted by Goodyear and Dudley (2015), the means for determining the order of
404 authorship should be stipulated in journal articles. The order of authorship for this paper was decided
405 by timing which author could hold their breath under at least 1 meter of water for the longest period of
406 time. Whilst not a conventional means of determining order of authorship, we offer it as a
407 consideration to other authors in the physical education disciplines for determining order of
408 authorship for future publications whereby colligative work is necessary.

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Figure 1: A Quality and Health Optimizing Physical Education Assessment Framework

Progression	'Prestructural'	'Unistructural'	'Multistructural'	'Relational'	Progression Threshold	'Extended Abstract'	
Learning Domain	The acquisition of unconnected information, which have no organisation and make no sense.	Simple and obvious connections are made, but their significance is not grasped.	A number of connections may be made, but the meta-connections between them are missed, as is their significance for the whole	The student is now able to appreciate the significance of the parts in relation to the whole		The student is making connections not only within the given subject area, but also beyond it, able to generalise and transfer the principles and ideas underlying the specific instance. Students have exceeded the cognitive, affective, social or psychomotor expectations of the developmentally appropriate standard.	
'Cognitive' The cognitive domain refers to intellect or mental abilities. Cognition involves receiving, processing, and organizing information that has been perceived through the senses and using the information appropriately.	Students do not adhere to simple rules/instructions of an assigned physical activity.	Students complete an assigned physical activity task within the rules and instructions assigned to that task.	Students understand multiple rules/instructions (both major and specific) of a physical activity. AND Students demonstrate the ability to solve essential tactical problems presented in the physical activity.	Students demonstrate different tactical and problem solving decisions in the course of their physical activity to adapt their performance to changing rules/instructions. AND Students demonstrate a capacity to develop strategy to improve their efficacy in the assigned physical task.	When students meet this level in any one of the Learning Domains, the context or complexity of the physical activity experience should change	Students can evaluate the effect different rules, tactics or strategy have in any given physical activity context. OR Students can create new strategies, tactics and rules for improving the quality and efficacy of physical activity. OR Students demonstrate how strategy, tactics and rules of play/movement can be applied in contexts beyond participation in physical activity context.	
'Affective' The affective domain encompasses feelings and emotions, behaviours, independence, self-esteem, and temperament.	Students do not control their own behaviour in physical activity settings. They require constant prompting and supervision. OR Students require external rewards or incentives to undertake a health or skill-related task in a physical activity setting.	Students can move in appropriate ways, executing the required movements if they are prompted, reminded or the movement is modeled.	Students readily accept numerous movement challenges AND Students practice movement skills in a self-motivated way.	Students are able to work without supervision. They can relate their movement needs in any given physical activity context AND Students move in ways that will improve their health and/or skill because they understand the relationship between movement and many aspects of their well-being (i.e. emotions, self-esteem, temperament)		Students can evaluate the effectiveness of their movement in improving their health and skill needs OR Students demonstrate that their movement decisions for health and skill might be adopted beyond their participation in physical activity.	
'Social' The social domain encompasses learning related to communication, teamwork, management and leadership It is	Students do not interact with others in physical activity settings.	Students control their own behaviour so that I don't interfere with others. They do this without prompting and constant supervision. AND Students responds to others during a physically active task when initiated by another person	Students show respect for others and are also willing to play and move with others. AND Students participate in mutually meaningful rituals associated with the physical activity experience	Students are able to extend their sense of responsibility to others by cooperating, giving support, showing empathy or showing the inner strength to deal with adversity. OR Students are capable of managing assigned activities with equity and fairness by defining and allocating roles for participating in the physical activity		Students demonstrate effective and empathetic leadership of their team/peers during physical activity OR Students see how their social learning experiences through physical activity may be adopted beyond their participation in physical activity to broader life lessons. OR Students empower others during physical activities (i.e. encouraging ownership, giving credit, grooming subordinates) OR Students build a following of others through positivity, vision sharing, generating commitment and maintaining integrity.	
'Psychomotor' Psychomotor objectives are concerned with the physically encoding of information, with movement and/or with activities where the gross and fine muscles are used for expressing or interpreting information or concepts.	Students cannot complete a movement skill/pattern without assistance or by imitation.	Students can complete a movement skill/pattern if they are assisted or if the movement is modeled for them to replicate.	Students can complete a movement skill/pattern unassisted or by independently following instructions.	Students can combine movement skills/patterns with other movement skills/patterns to perform successful movement sequences with very few errors.		Students can appraise their own movement competence as it varies. OR Students create new adaptations to these skills to make them more effective in different contexts. OR Students can apply these skills in context for which they were not intended.	
Learning Context Learning is observed and assessed through a designated physical activity experience	No apparent learning observed in a physical activity context Quality and quantity of physical activity do not improve	Quality and quantity of physical activity improve in proportion to learning progression and context (Quality indicators could include: efficiency of movement, etc...) (Quantity indicators could include: MVPA minutes, etc...)					

Figure 2: An Applied Quality and Health Optimizing Physical Education Assessment Framework for a student during a soccer unit (Case study: James)

Progression	'Prestructural'	'Unistructural'	'Multistructural'	'Relational'	Progression Threshold	'Extended Abstract'
Learning Domain	The acquisition of unconnected information, which have no organisation and make no sense.	Simple and obvious connections are made, but their significance is not grasped.	A number of connections may be made, but the meta-connections between them are missed, as is their significance for the whole	The student is now able to appreciate the significance of the parts in relation to the whole		The student is making connections not only within the given subject area, but also beyond it, able to generalise and transfer the principles and ideas underlying the specific instance. Students have exceeded the cognitive, affective, social or psychomotor expectations of the developmentally appropriate standard.
'Cognitive'	Students do not adhere to simple rules/instructions of an assigned physical activity.	Students complete an assigned physical activity task within the rules and instructions assigned to that task.	Students understand multiple rules/instructions (both major and specific) of a physical activity. AND Students demonstrate the ability to solve essential tactical problems presented in the physical activity.	Students demonstrate different tactical and problem solving decisions in the course of their physical activity to adapt their performance to changing rules/instructions. AND Students demonstrate a capacity to develop strategy to improve their efficacy in the assigned physical task.	When students meet this level in any one of the Learning Domains, the context or complexity of the physical activity experience should change	Students can evaluate the effect different rules, tactics or strategy have in any given physical activity context. OR Students can create new strategies, tactics and rules for improving the quality and efficacy of physical activity. OR Students demonstrate how strategy, tactics and rules of play/movement can be applied in contexts beyond participation in physical activity context.
'Affective'	Students do not control their own behaviour in physical activity settings. They require constant prompting and supervision. OR Students require external rewards or incentives to undertake a health or skill-related task in a physical activity setting.	Students can move in appropriate ways, executing the required movements if they are prompted, reminded or the movement is modeled.	Students readily accept numerous movement challenges AND Students practice movement skills in a self-motivated way.	Students are able to work without supervision. They can relate their movement needs in any given physical activity context AND Students move in ways that will improve their health and/or skill because they understand the relationship between movement and many aspects of their well-being (i.e. emotions, self-esteem, temperament)		Students can evaluate the effectiveness of their movement in improving their health and skill needs OR Students demonstrate that their movement decisions for health and skill might be adopted beyond their participation in physical activity.
'Social'	Students do not interact with others in physical activity settings.	Students control their own behaviour so that I don't interfere with others. They do this without prompting and constant supervision. AND Students responds to others during a physically active task when initiated by another person	Students show respect for others and are also willing to play and move with others. AND Students participate in mutually meaningful rituals associated with the physical activity experience	Students are able to extend their sense of responsibility to others by cooperating, giving support, showing empathy or showing the inner strength to deal with adversity. OR Students are capable of managing assigned activities with equity and fairness by defining and allocating roles for participating in the physical activity		Students demonstrate effective and empathetic leadership of their team/peers during physical activity OR Students see how their social learning experiences through physical activity may be adopted beyond their participation in physical activity to broader life lessons. OR Students empower others during physical activities (i.e. encouraging ownership, giving credit, grooming subordinates) OR Students build a following of others through positivity, vision sharing, generating commitment and maintaining integrity.
'Psychomotor'	Students cannot complete a movement skill/pattern without assistance or by imitation.	Students can complete a movement skill/pattern if they are assisted or if the movement is modeled for them to replicate.	Students can complete a movement skill/pattern unassisted or by independently following instructions.	Students can combine movement skills/patterns with other movement skills/patterns to perform successful movement sequences with very few errors.		Students can appraise their own movement competence as it varies. OR Students create new adaptations to these skills to make them more effective in different contexts. OR Students can apply these skills in context for which they were not intended.
Learning Context	No apparent learning observed in a physical activity context Quality and quantity of physical activity do not improve	Quality and quantity of physical activity improve in proportion to learning progression and context (Quality indicators could include: efficiency of movement, etc...) (Quantity indicators could include: MVPA minutes, etc...)				

Figure 3: An Applied Quality and Health Optimizing Physical Education Assessment Framework for a student during a soccer unit (Case study: Katie)

Progression	'Prestructural'	'Unistructural'	'Multistructural'	'Relational'	Progression Threshold	'Extended Abstract'
Learning Domain	The acquisition of unconnected information, which have no organisation and make no sense.	Simple and obvious connections are made, but their significance is not grasped.	A number of connections may be made, but the meta-connections between them are missed, as is their significance for the whole	The student is now able to appreciate the significance of the parts in relation to the whole		The student is making connections not only within the given subject area, but also beyond it, able to generalise and transfer the principles and ideas underlying the specific instance. Students have exceeded the cognitive, affective, social or psychomotor expectations of the developmentally appropriate standard.
'Cognitive'	Students do not adhere to simple rules/instructions of an assigned physical activity.	Students complete an assigned physical activity task within the rules and instructions assigned to that task.	Students understand multiple rules/instructions (both major and specific) of a physical activity. AND Students demonstrate the ability to solve essential tactical problems presented in the physical activity.	Students demonstrate different tactical and problem solving decisions in the course of their physical activity to adapt their performance to changing rules/instructions. Students demonstrate a capacity to develop strategy to improve their efficacy in the assigned physical task.	When students meet this level in any one of the Learning Domains, the context or complexity of the physical activity experience should change	Students can evaluate the effect different rules, tactics or strategy have in any given physical activity context. OR Students can create new strategies, tactics and rules for improving the quality and efficacy of physical activity. OR Students demonstrate how strategy, tactics and rules of play/movement can be applied in contexts beyond participation in physical activity context.
'Affective'	Students do not control their own behaviour in physical activity settings. They require constant prompting and supervision. OR Students require external rewards or incentives to undertake a health or skill-related task in a physical activity setting.	Students can move in appropriate ways, executing the required movements if they are prompted, reminded or the movement is modeled.	Students readily accept numerous movement challenges AND Students practice movement skills in a self-motivated way.	Students are able to work without supervision. They can relate their movement needs in any given physical activity context AND Students move in ways that will improve their health and/or skill because they understand the relationship between movement and many aspects of their well-being (i.e. emotions, self-esteem, temperament)		Students can evaluate the effectiveness of their movement in improving their health and skill needs OR Students demonstrate that their movement decisions for health and skill might be adopted beyond their participation in physical activity.
'Social'	Students do not interact with others in physical activity settings.	Students control their own behaviour so that I don't interfere with others. They do this without prompting and constant supervision. AND Students responds to others during a physically active task when initiated by another person	Students show respect for others and are also willing to play and move with others. AND Students participate in mutually meaningful rituals associated with the physical activity experience	Students are able to extend their sense of responsibility to others by cooperating, giving support, showing empathy or showing the inner strength to deal with adversity. OR Students are capable of managing assigned activities with equity and fairness by defining and allocating roles for participating in the physical activity		Students demonstrate effective and empathetic leadership of their team/peers during physical activity OR Students see how their social learning experiences through physical activity may be adopted beyond their participation in physical activity to broader life lessons. OR Students empower others during physical activities (i.e. encouraging ownership, giving credit, grooming subordinates) OR Students build a following of others through positivity, vision sharing, generating commitment and maintaining integrity.
'Psychomotor'	Students cannot complete a movement skill/pattern without assistance or by imitation.	Students can complete a movement skill/pattern if they are assisted or if the movement is modeled for them to replicate.	Students can complete a movement skill/pattern unassisted or by independently following instructions.	Students can combine movement skills/patterns with other movement skills/patterns to perform successful movement sequences with very few errors.		Students can appraise their own movement competence as it varies. OR Students create new adaptations to these skills to make them more effective in different contexts. OR Students can apply these skills in context for which they were not intended.
Learning Context	No apparent learning observed in a physical activity context Quality and quantity of physical activity do not improve	Quality and quantity of physical activity improve in proportion to learning progression and context (Quality indicators could include: efficiency of movement, etc...) (Quantity indicators could include: MVPA minutes, etc...)				

Figure 4: A hypothetical assessment instrument based on the Quality and Health Optimizing Physical Education Assessment Framework

PE Program Unit: Invasion games - Soccer

PE Curricula Standards/Outcomes to be assessed: *Outcome 2 - 5.4* adapts, transfers and improvises movement skills and concepts to improve performance; *Outcome 4 - 5.10* adopts roles to enhance their own and others' enjoyment of physical activity (Observed behaviours of these outcomes all exist at the Multistructural level in the instrument)

Student checklist: During the unit, which of the following behaviours did the student exhibit

	Not achieving	Attention Needed	Working Toward Outcomes	Achieving Outcomes	Progression Threshold	Exceeding Outcomes
'Cognitive'	<ul style="list-style-type: none"> <input type="checkbox"/> Did not adhere to the simple rules/instructions during the soccer unit. 	<ul style="list-style-type: none"> Completes at least one of the following assigned tasks within the rules and instructions of a soccer unit. <input type="checkbox"/> Staying inside in offence <input type="checkbox"/> Not committing direct foul infringements 	<ul style="list-style-type: none"> <input type="checkbox"/> Understands multiple rules/instructions of soccer. AND Demonstrates the ability to solve essential tactical problems presented in soccer. <input type="checkbox"/> Attacking space <input type="checkbox"/> Zonal defence 	<ul style="list-style-type: none"> Demonstrates different tactical and problem solving decisions in the course of a soccer game <input type="checkbox"/> Executing an offside trap <input type="checkbox"/> Playing a ball off in offence AND Demonstrates improved their decision efficacy in the soccer unit. <input type="checkbox"/> Transitions from man to zonal defence <input type="checkbox"/> Transitions from offence to defence 		<ul style="list-style-type: none"> <input type="checkbox"/> Evaluates the effect different rules, tactics or strategy in the game of soccer. OR <input type="checkbox"/> Creates new strategies, tactics and rules for improving the quality of their soccer performance. OR <input type="checkbox"/> Demonstrates how strategy, tactics and rules of play/movement can be applied in contexts beyond participation in a soccer game.
'Affective'	<ul style="list-style-type: none"> <input type="checkbox"/> Do not control their own behaviour during the soccer unit. They require constant prompting and supervision. OR <input type="checkbox"/> Requires external rewards or incentives to undertake a health or skill-related tasks during the soccer unit. 	<ul style="list-style-type: none"> <input type="checkbox"/> Moves in appropriate ways for the game of soccer, executing the required movements when they are prompted, reminded or the movement is modeled. (i.e. run, pass, shoot when prompted) 	<ul style="list-style-type: none"> <input type="checkbox"/> Readily accepts numerous movement challenges in the game of soccer (i.e. running, passing, and shooting as required in the context of the game) AND <input type="checkbox"/> Practices soccer skills in a self-motivated way. (i.e. drill and minor team game periods are focused and on task) 	<ul style="list-style-type: none"> <input type="checkbox"/> Works on drills or minor team games without supervision. AND <input type="checkbox"/> Trains in ways that will improve their health and/or skill in soccer because they understand the relationship between training and improved performance and enjoyment of soccer 		<ul style="list-style-type: none"> <input type="checkbox"/> Evaluates the effectiveness of their movement in soccer improving their broader health and skill needs (i.e. CRF, Anaerobic fitness, kicking strength, agility) OR <input type="checkbox"/> Demonstrates their movement decisions for health and skill might be adopted beyond their participation in soccer to other invasion games.
'Social'	<ul style="list-style-type: none"> <input type="checkbox"/> Do not interact with others during the soccer unit. 	<ul style="list-style-type: none"> <input type="checkbox"/> Control their own behaviour so they don't interfere with others. They do this without prompting and constant supervision. AND <input type="checkbox"/> Responds to others during a game of soccer when initiated by another person 	<ul style="list-style-type: none"> <input type="checkbox"/> Shows respect for others and are also willing to play and move with others. AND <input type="checkbox"/> Participates in mutually meaningful rituals associated with soccer (i.e. shakes hands with the opposition after the game, cheers the winning team) 	<ul style="list-style-type: none"> <input type="checkbox"/> Extends their sense of responsibility to others by cooperating, giving support, showing empathy or showing the inner strength to deal with adversity. (i.e. supports injured players, consoles teammates/opposition in adverse game scenarios) OR <input type="checkbox"/> Manages assigned activities with equity and fairness by defining and allocating roles within a soccer unit. (i.e. assumes either player or officiating roles within the soccer unit) 		<ul style="list-style-type: none"> <input type="checkbox"/> Demonstrates effective and empathetic leadership of their team/peers during the soccer unit OR <input type="checkbox"/> Shows how their social learning experiences through soccer may be adopted beyond their participation in soccer to broader life lessons. OR <input type="checkbox"/> Empowers others during the soccer unit (i.e. encouraging ownership, giving credit, grooming subordinates) OR <input type="checkbox"/> Builds a following of others through positivity, vision sharing, generating commitment and maintaining integrity.
'Psychomotor'	<ul style="list-style-type: none"> <input type="checkbox"/> Cannot complete a designated soccer skill/pattern without assistance or by imitation. 	<ul style="list-style-type: none"> <input type="checkbox"/> Completes assigned soccer skills/patterns if they are assisted or if the movement is modeled for them to replicate. 	<ul style="list-style-type: none"> <input type="checkbox"/> Completes assigned soccer skills/patterns unassisted or by independently following instructions. 	<ul style="list-style-type: none"> <input type="checkbox"/> Combines a number of assigned soccer skills/patterns with other locomotor, stability and manipulation skills to perform successful movement sequences with very few errors. 		<ul style="list-style-type: none"> <input type="checkbox"/> Appraises their own soccer competence as it varies. OR <input type="checkbox"/> Creates new adaptations to these skills to make them more effective in different contexts. OR <input type="checkbox"/> Applies these skills in context for which they were not intended.
Physical activity	<ul style="list-style-type: none"> <input type="checkbox"/> Exhibits very low levels of MVPA intensity (<10% of PE time) <input type="checkbox"/> Quality of PA is poor 	<ul style="list-style-type: none"> <input type="checkbox"/> Exhibits low levels of PA intensity (10%-20%) of PE class time <input type="checkbox"/> Quality of PA is below what is needed to make progress 	<ul style="list-style-type: none"> <input type="checkbox"/> Exhibits increasing levels of PA intensity (20%-40%) of PE class time <input type="checkbox"/> Quality of PA is what is needed to make progress toward the outcomes 	<ul style="list-style-type: none"> <input type="checkbox"/> Exhibits MVPA for approximately 50% of total PE time on during most lessons <input type="checkbox"/> Quality of PA is consistent with all learning challenges 		<ul style="list-style-type: none"> <input type="checkbox"/> Exhibits MVPA often in excess of 50% of PE class time <input type="checkbox"/> Quality of PA surpasses that expected of a students of similar age/grade

