

**Preparing pre-service teachers to design instructionally aligned lessons through
constructivist pedagogical practices**

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1 **Preparing physical education pre-service teachers to design instructionally aligned lessons**
2 **through constructivist pedagogical practices**

3
4 **Abstract**

5 Examining how teacher education influences preservice teachers' (PSTs) application of content
6 knowledge, decision making when planning for teaching, creation of innovative teaching
7 practices and design of aligned instruction, has significant implications for understanding
8 learning to teach. The purpose of this study was to explore the extent to which the constructivist
9 pedagogies (e.g., interactive community discussions, problem-solving, group challenges)
10 employed by teacher educators through the implementation of a rich task (Macdonald, Hunter &
11 Tinning, 2007) assisted PSTs in their understanding and construction of knowledge about
12 instructional alignment. Data collection employed rich tasks and focus group interviews with a
13 sample of 31 physical education teacher education (PETE) PSTs enrolled on a one-year Graduate
14 Diploma Physical Education programme. Data were analyzed inductively (Patton, 1990) using
15 the constant comparative method (Rubin & Rubin, 1995). Results revealed that PSTs varied in
16 their articulation of the various elements of instructional alignment that were captured in the rich
17 task. Through the use of such constructivist strategies as problem-solving, group discussions, and
18 critical friends, PSTs understood and valued the process of instructional alignment as they
19 moved from feelings of fear and apprehension to being confident in their own development.
20 Areas of strength and deficiency that were noted in the PSTs' attempts to design instructionally
21 aligned lessons will guide the teacher educators in revising programme components and their
22 own practice.

23
24 **Key Words**

25 Constructivist pedagogy, learning to teach, instructional alignment

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28

29 **1. Introduction**

30 Teacher learning and learning how to teach is a major focus of most teacher education
31 programmes worldwide. Avalos (2011) contends that teacher learning should ultimately be
32 focused on student growth and represents a type of teacher professional development that begins
33 within initial teacher education and continues throughout a teacher's career. As a result of her
34 literature review on teacher professional development, she encourages teacher educators to
35 remember that learning to teach requires personal commitment, and a collective focus to
36 cooperate and challenge one another's beliefs and perspectives while considering options that
37 might improve practice. Organization for Economic Co-operation and Development (OECD)
38 recognises initial teacher learning as just one phase of the teacher learning continuum, albeit a
39 complex and challenging phase (OECD, 2005).

40 This study examines the extent to which our pedagogical practices as teacher educators
41 encouraged pre-service teachers' (PSTs') perspectives and dispositions towards learning to
42 teach, appreciating that there is a strong association between the design of the learning
43 environment and the quality of PSTs' experiences and their learning (Darling-Hammond, 1997).
44 More specifically, the purpose of this study was to explore the extent to which the constructivist
45 pedagogies employed by teacher educators assisted PSTs in their understanding and construction
46 of knowledge about instructional alignment. The study represents an effort to ground PST
47 learning in a particular set of experiences that promote meaningful engagement with, and
48 reflection on, the notion of instructional alignment as a practice of good teaching. In order to
49 frame our intentions of working with PSTs in meaningful ways to support their learning as
50 teachers, it is imperative that we engage with the complexity of learning to teach, constructivist

51 theory and associated pedagogies, and instructional alignment as a pre-requisite for worthwhile
52 and meaningful learning.

53

54 1.1 Learning to teach

55 Whether at the preservice or beginning teacher level, learning to teach is complex and
56 requires learning content, learning about learning, and learning about teaching. There is a wealth
57 of international research in general education and across all subject areas that examines learning
58 to teach and how a beginning teacher moves from a novice teacher to a competent, and even
59 expert, teacher. Some of this literature is focused on the types of knowledge needed to teach
60 (Loughran, 2006; Lowenberg-Ball, Hoover Thames, & Phelps, 2008; Rovegno, 1993; Shulman,
61 1986), the stages through which PSTs pass in their quest to become competent teachers (Furlong
62 & Maynard, 1995), and the phases of teacher socialisation that impact a teacher's development
63 (Lawson, 1987; MacPhail, O'Sullivan & Tannehill, 2010). Teacher education is responsible for
64 setting the stage for PSTs, and ultimately novice teachers, to work through these challenges
65 using different pedagogies, at different times, and with different learners. These pedagogies take
66 diverse forms and involve various learning theories and perspectives that guide learning
67 including behaviourist, cognitive, constructivist, social learning, and more recently complexity
68 theory, all of which offer diverse approaches for teaching practices.

69 When learning to teach, preservice and novice teachers are forced to negotiate the
70 relationship between learning how to teach and practicing teaching with young people in varying
71 contexts (Loughran, 2006). **How teachers' knowledge is developed is of critical concern to
72 teacher education internationally. If teacher education is to educate teachers to design and deliver
73 quality education programmes to impact student learning, they must recognise and acknowledge
74 how teachers construct knowledge, the conditions under which this learning is most effective and
75 the pedagogical strategies that might facilitate this knowledge development (Tsangaridou, 2006).**

76 An abundance of research has examined the process by which these inexperienced and
77 novice teachers learn to teach and the content considered essential for this teaching. This
78 includes content knowledge (Graber, 1995; Herold & Waring, 2009), pedagogical content
79 knowledge learned simultaneously with content knowledge (Shulman, 1986) and more recently
80 the idea of PSTs appreciating the flexibility of content when teaching (Darling-Hammond &
81 Snowdon, 2005; Loewenberg-Ball, 2000).

82 Recognising the importance of pedagogical content knowledge (PCK) in the design and
83 teaching of quality physical education, Tsangaridou (2006) summarised much of the research on
84 PCK in physical education. Findings that she reported as having important implications for
85 teachers' construction of PCK include: 1) PSTs' PCK is insufficient in today's school contexts
86 (Rovegno, 1992, 1993, 1994, 1995), 2) PSTs' content knowledge lacks developmental
87 appropriateness (Rovegno, 1994, 1995), 3) PSTs' use of PCK during teaching practice is linked
88 to level being taught, prior experience in using these pedagogies, interactions with and support
89 from cooperating teachers, and response received from pupils (Graber, 1995), 4) PCK may need
90 to develop following acquisition of more in-depth knowledge about teaching (Sebrin, 1995), 5)
91 PCK develops as a result of teachers willing to focus on analysing, adapting and revising their
92 own teaching practices (Griffin et al, 1996), 6) PCK can have a significant impact a PSTs
93 pedagogical practice (Tsangaridou, 2002), and 7) PSTs PCK develops as a result of what
94 McCaughtry and Rovegno (2003) refer to as the reality of the teaching context e.g., moving from
95 blaming students as opposed to recognising their own inadequacies and the complexity of motor
96 development, or ignoring students feelings and emotions by coming to terms with how emotions
97 can enhance student learning. Constructivist pedagogy emphasises the role of pedagogical
98 content knowledge and the ability to engage learners in knowledge construction.

99 Constructivist pedagogies influence on learning to teach

100 A constructivist approach to the teaching of teachers, prominent in teacher education is
101 based on the notion of using current knowledge and past experiences as the framework for
102 constructing new knowledge and new meaning (Behets & Vergauwen, 2006; Richardson, 1997;
103 Tinning, 2006). Use of constructivist pedagogies requires teacher education programmes to
104 redesign and reformat many of their practices to invite and utilize the individual and collective
105 voice of the PST (Rovegno, 2003; Winitzky & Kauchak, 1997). Kirk and Macdonald (1998)
106 encourage the use of constructivist approaches to teacher education suggesting that they provide
107 opportunities for critical, in-depth and important thinking about teaching and learning.

108 Constructivism suggests learning is experiential in that people create knowledge and
109 draw meaning from that knowledge through their own experiences and ideas (Dewey, 1933,
110 1998; Kolb, 1975). From a constructivist perspective, learning is both cultural and social
111 involving social interaction and collaboration with learning peers, as well as interaction with
112 more knowledgeable individuals within society (Biggs, 1996; Kuiper, Volman & Terwel, 2009;
113 Pontecorvo, 2007). For this experiential learning process to be sustained and developed,
114 Vygotsky (1978) argues that learners will progress from one educational task to more
115 challenging tasks only through improved self confidence in their ability to be successful in
116 various problem solving experiences. Brooks et al (1993), similarly, suggested that
117 constructivist pedagogies include 1) inspiring student initiative, 2) accepting student autonomy,
118 3) employing cognitive language to challenge critical thinking, 4) fostering independent thinking
119 and innovation by building on student responses, 5) developing knowledge construction by
120 challenging students to recognise prior learning, 6) provide interactive opportunities among
121 students, 7) encourage critical thinking and problem solving individually and collectively, and 8)
122 provide time, prompts, redirected questions and probing to push students to develop and
123 integrate new knowledge and construct their own meaning. Fosnot (1996) recommends five
124 principles of constructivism with implications for educational practice with which teachers and

125 teacher educators engage as they design learning experiences. He suggests that (i) learning is
126 developmental, (ii) learning requires cognitive dissonance where questioning facilitates learning,
127 (iii) reflexivity drives learning, (iv) community dialogue promotes thinking, and (v) through the
128 process of learning new conceptions of knowledge are often developed.

129 In their review of physical education research from a constructivist perspective, Rovegno
130 and Dolly (2009) stress that, ‘constructivism is a theory of learning and not a set of instructional
131 strategies’ (p. 243). As their education colleagues have done, they highlight the widely accepted
132 principles on which constructivism is based, i.e., learning is active, knowledge is socially
133 constructed, and learners create knowledge in relation to what they already know (Holt-
134 Reynolds, 2000). Constructivist pedagogy encourages knowledge fashioned by learners, taking
135 place in classrooms created as learning communities where learning occurs through peer
136 interaction, collaboration and student ownership of educational experiences (Azzarito & Ennis,
137 1996; Kirk and Macdonald, 1998). When referring to previous work, Hastie and Curtner-Smith
138 (2006) encourage teacher educators that, when using a constructivist approach to teaching
139 physical education, ‘students must be *active learners*, in that they perform tasks which involve
140 solving problems and making decisions; *social learners*, in that they formulate knowledge by
141 interacting with their peers; and *creative learners*, in that they discover and understand
142 knowledge by experimenting with the subject matter’ [authors’ emphasis] (p. 22).

143 An increased interest in constructivist theory and practices in physical education has
144 made an impact on teacher education programmes as they assist PSTs in developing their
145 teaching skills and knowledge. Brock, Rovegno and Oliver (2009) propose that two physical
146 education curriculum models, Sport Education and Teaching Games for Understanding, utilize
147 constructivist pedagogies that foster students making sense of their own learning. Examples of
148 these pedagogies include small group work (often in teams), responsibility (for self and team),
149 leadership (in the form of roles beyond player), problem solving (what skills to use when), and

150 decision making (making tactical decisions). Moreover, both of these curriculum models require
151 students to construct their own knowledge through social interaction with classmates (Rovegno
152 & Dolly, 2009). Light (2008) also encourages recognition that Teaching Games for
153 Understanding and Sport Education can be best understood through Lave and Wenger's (1991)
154 situated learning framework as reflected in a student centered team approach, critical thinking
155 and group problem solving. As with Light (2008), Rovegno (1998) argues that physical
156 education teachers need a strong understanding of constructivist principles if they are to
157 implement physical education effectively and allow students to achieve success.

158 Light (2008) highlights that constructivism has become a mainstay in the physical
159 education literature. He encourages physical educators to consider what has been termed
160 'complex learning theory' to convey what all constructivist approaches have in common, that is,
161 learning is a process, is student-centered, contextual, develops from experience, involves
162 interaction between the mind and the body, and is complex and unpredictable. Light (2008)
163 notes the prominent role of the body in complex learning theory and argues that this provides
164 physical educators the opportunity for 'reconceptualizing the teaching of physical education and
165 its place in the curriculum' (p. 28) to extend beyond acquisition of skills and to view learning
166 content more holistically and seldom linear.

167 Internationally, discussion of complex learning theory in physical education and
168 education is evident. In 2006, the Asia-Pacific Educational Research Association (APERA)
169 International Conference focused on the application of complex learning theory in curricular
170 reforms in Hong Kong, with Fong (2006a) suggesting implications of complex learning theory
171 for pedagogy and student learning. Perhaps the most critical of these implications is that schools
172 must adapt, adjust and even reinvent themselves to address the changing and evolving student
173 needs, while teacher education programmes must consider how to more effectively help PSTs to
174 work with young people in challenging and difficult settings (Fong, 2006b). Thorburn, Jess, and

175 Atencio (2011) describe their efforts to design a new vision of physical education pedagogy in
176 Scotland that requires teachers to move from what they term as a narrow ‘pedagogy of certainty’
177 to a more open ‘pedagogy of emergence’. This new ‘pedagogy of emergence’ reflects many of
178 the characteristics of complex learning theory, ‘emphasising teacher and student reflection, co-
179 construction of knowledge, active exploration and the unpredictable and non-linear nature of
180 learning to move’ (Jess, et al, 2011, p. 182). As noted by Jess et al (2011) ‘pedagogy of
181 emergence’ would be reflected by physical education teachers who facilitate student learning, are
182 co-creators of knowledge and in some respects co-learners in the learning process.

183 As PSTs learn to teach they learn to construct their understanding of instructional design
184 and alignment.

185

186 1.2 Instructional alignment

187 Constructivism and instructional alignment contribute to the concept of ‘constructive
188 alignment’, which represents a ‘marriage’ between a constructivist understanding of the nature of
189 learning, and an aligned design for teaching;

190 ‘a working version of constructivism can be integrated with instructional design at three
191 crucial points: the curriculum or unit objectives are clearly stated in terms of content specific
192 levels of understanding that imply appropriate performances, the teaching methods require
193 students to be placed in contexts that will likely elicit those performances, and the assessment
194 tasks address those same performances’ (Biggs, 1996, p. 361).

195 Teachers need to recognise that optimal learning environments need to be designed for
196 specific learning outcomes, student background and prior knowledge, and the context in which
197 learning will occur. Wiggins and McTighe (1998) encourage teachers to plan backwards from
198 the ‘big ideas’ they want students to learn, choose teaching strategies to facilitate students
199 reaching those ideas, and design assessment tools that will demonstrate students having achieved

200 success. This constitutes instructional alignment where goals, assessment, teaching strategies and
201 learning experiences are aligned, promoting richer learning for students. Instructional alignment
202 is a pre-requisite for worthwhile and meaningful learning, but should not be viewed as a panacea
203 in and of itself (Carter, 2008). In teacher education it is critical that we provide opportunities for
204 PSTs to (i) both experience and learn to design programmes that demonstrate alignment between
205 what we want students to know and be able to do, (ii) enhance the opportunities students receive
206 to learn, practice and explore what they have been taught and (iii) explore how we assess for
207 learning, in other words, we need to help PSTs search for their own understandings and how
208 these might align with those of their students.

209 Instructional alignment has had limited exposure in the physical education literature.
210 Where it has been examined, the interest has been attached to the increasing interest in student
211 learning as a result of (authentic) assessment and accountability (James, 2004; James et al., 2008;
212 Lund, 1992) and less with the perceptions that teachers and learners have of instructional
213 alignment. We propose modelling a specific form of pedagogical practice and associated
214 assessment utilized in physical education teacher education (PETE) that encapsulates our interest
215 as teacher educators to not only teach and model the practices of instructional alignment but also
216 to allow PSTs to live the experience.

217 We acknowledge that the relationship between the three components of instructional
218 alignment (learning goals, assessment, instructional strategies) is bidirectional (Chen &
219 McNamee, 2006). In practice, we use assessment activities to both enhance PSTs' learning and
220 to evaluate the effectiveness of our instruction. Subsequently, this directs the nature of
221 (revisiting) future curriculum activities with the result being, 'the pattern is no longer a linear
222 sequence with assessment preceding curriculum development. Instead, the pattern is a spiral with
223 each leading to the other in a continuous process' (Chen & McNamee, 2006, p. 125). We also
224 introduce design-focused evaluation, 'an approach that seeks to provide guidance in

225 systematically addressing questions to the issue of the links between curriculum designs and the
226 learning they elicit' (Smith, 2008, p. 644). That is, we pose questions to gain PSTs' perceptions
227 of the effectiveness of the learning experiences / tasks encouraged through our instructional
228 practices and intentions for facilitating the development of the assessed learning outcomes.

229

230 **2. Purpose of Study**

231 There is a dearth of research reporting how PSTs apply knowledge learned during teacher
232 education (Cochran-Smith, 2005). Examining how teacher education influences PSTs'
233 application of content knowledge, decision making when planning for teaching, creation of
234 innovative teaching practices and design of aligned instruction, has significant implications for
235 understanding learning to teach. The purpose of this study was to explore the extent to which the
236 constructivist pedagogies employed by teacher educators assisted PSTs in their understanding
237 and construction of knowledge about instructional alignment. It was important that we examine
238 how PSTs experienced and viewed instructional alignment in practice, and the extent to which
239 they were able to use their developing skill in designing worthwhile and enduring knowledge
240 that would be viewed as realistic to young people. We consider how the coursework undertaken
241 by PSTs and the constructivist pedagogies employed in teacher education influenced PSTs
242 learning to teach. **Drawing on the work of Azzarito and Ennis (1996), Kirk and Macdonald**
243 **(1998), and Fosnot's principles (1996), the pedagogical strategies we chose to employ in these**
244 **modules included peer interaction, community discussions, problem solving tasks and group**
245 **sharing. Such strategies were utilised to foster PSTs drawing connections between their personal**
246 **experiences and beliefs, knowledge created through peer interaction, and PSTs taking**
247 **responsibility for collaboratively designed instructional materials. **These interactive****
248 **constructivist pedagogies recognize the importance of teachers (teacher educators and PSTs)**
249 **working together in a community to develop skills, knowledge, expertise, share practices**

250 (Fosnot, 1996). This collective learning has been encouraged through teacher communities and
251 networks and provides us with a foundation for some of the pedagogical practices we chose. We
252 explore how one teacher education programme encouraged and facilitated PSTs working as a
253 community of learners, drawing on the framework proposed by Hammerness, Darling-
254 Hammond, Bransford, Berliner, Cochran-Smith, McDonald, and Zeichner (2005), who state:
255 ‘New teachers learn to teach in a *community* that enables them to develop a *vision* for their
256 practice; a *set of understandings* about teaching, learning and children; *dispositions* about
257 how to use this knowledge; *practices* that allow them to act on their intentions and beliefs;
258 and tools that support their efforts.’ [authors’ emphasis] (p. 69).

259 This study developed from an interest in understanding the learning processes of our
260 PSTs and the impact of specific pedagogies utilized by teacher educators. The research is
261 significant because it will provide insight for all teacher educators, intent on examining their own
262 practices with PSTs, pedagogical aspects of their teacher education programmes, and how PSTs
263 interpret their learning experiences as they learn content, learn about learning and learning to
264 teach. (Rovegno & Dolly, 2009).

265

266 **3. Methodology**

267 3.1. Context of the PETE Program

268 The first two authors were involved in delivering two first-semester pedagogy-related
269 modules to two one-year cohorts undertaking a one-year Graduate Diploma program in physical
270 education (16 PST were enrolled in year one of the study and 15 PSTs in year two). In both year
271 groups there was a range of ages (20 to 44 years) and more females than males (11 females in
272 year one of the study and 12 in year two). These PSTs came from non-teaching undergraduate
273 programs in physical education or closely aligned areas of study in Ireland, the UK or the USA.
274 Successful completion of this Graduate Diploma program results in PSTs being qualified to

275 teach Irish post-primary physical education. The expectation of PSTs on entering the one-year
276 Graduate Diploma program in physical education is that they have gained a sufficient level of
277 expertise in subject content knowledge (both applied and theoretical), allowing the program
278 more scope to develop and examine specific, observable teaching skills associated with student
279 learning. Matching this with Feiman-Nemser's (1990) dominant conceptual orientations of
280 teacher education programs, the program reported here promotes more of a 'personal orientation'
281 (focus on the teaching competencies of PSTs) and less of an 'academic orientation' (focus on
282 subject matter of games, dance, gym, etc).

283

284 3.2. The Two Pedagogy-Related Modules

285 PSTs attended both modules for four hours each on a weekly basis over twelve weeks. The
286 first module, 'Physical Education Curriculum and Assessment' provided PSTs with an
287 opportunity to understand curriculum concepts and investigate the extent to which personal value
288 orientations and philosophies impact on curricular choices. Along with PSTs' understanding of
289 the (physical education) curriculum within the Irish school system, and what they believe is
290 worth learning, PSTs were guided in using selected curriculum and instruction models in their
291 own teaching. Understanding assessment and its relationship to learning goals and learning
292 experiences intended to allow PSTs to determine what is worth assessing and how this can be
293 done in a meaningful, relevant and effective way. The second module, 'Introduction to Teaching
294 in Physical Education' assisted the PST in making the connection to the alignment of teaching in
295 physical education, the teaching and learning process and effective instructional models and
296 teaching skills / strategies. PSTs learned about, and practiced, foundational management
297 strategies, how to design learning experiences and select instructional models / skills / strategies
298 for delivering developmentally and culturally relevant physical education experiences that

299 respect students as independent learners. Table 1 illustrates the learning outcomes, tentative
300 schedule of weekly themes and assessment points for each module.

301 [Insert Table 1 here]

302 In conjunction with these two modules, PSTs were assigned a post-primary school where
303 they taught on ten Mondays throughout 10 weeks of the semester. Throughout both modules and
304 the Monday teaching practice, PSTs reflected upon, critiqued and discussed their school
305 experiences with broader discussions of research on teaching in physical education and the role
306 of the physical educator in the delivery of an equitable, coherent, and culturally relevant physical
307 education in contemporary Irish schools. Within this reflection, and subsequent discussions,
308 there was a focus on how instructionally aligned lessons impacted student learning.

309 The content of both modules was delivered through learning experiences that matched what
310 we wanted PSTs to know and be able to do at the conclusion of the modules which demonstrates
311 our design of instructionally aligned modules of the content and pedagogical skills we wanted
312 our PSTs to learn. Assessment across these two modules is both formative and summative,
313 illustrating our efforts of allowing PSTs to ‘live’ and learn the process of instructional alignment.

314

315 **4. Data collection**

316 The purpose of this study was to explore the extent to which the constructivist pedagogies
317 employed by teacher educators assisted PSTs in their understanding and constructions of
318 knowledge about instructional alignment. In a bid to examine how PSTs’ experienced and
319 viewed instructional alignment in practice, data collection employed the use of a ‘rich task’ and
320 subsequent rich task scoring rubric related to the specific pedagogy used with PSTs. In addition,
321 focus groups were designed to elicit PST perceptions of the constructivist pedagogy.

322

323 4.1. Rich task

324 Constructivist pedagogies are explored in this study through the notion of the ‘rich task’,
325 derived from the work of Education Queensland (Cooper, Nuyen & Baturu, 2003; Luke, 1999;
326 Macdonald, Hunter & Tinning, 2007). The rich task presents substantive, real problems for the
327 students to solve, based on a range of learning outcomes, and may be used as an organizational
328 framework for the design of a unit of work (MackPhail & Halbert, 2010). The task is deemed to
329 be ‘rich’ when it is authentic for the student and relevant to the learning outcomes in question. It
330 should also contain 1) transparent criteria and standards, 2) encompass more than one learning
331 outcome, 3) involve acquiring, applying and evaluating knowledge, and 4) provide opportunities
332 for students to demonstrate subject knowledge, skills and understanding (MacPhail & Halbert,
333 2010).

334

335 4.2 Rich Task Scoring Rubric

336 The rich task was a way to examine the PSTs’ learning of instructional alignment through
337 authentic and practical application. The rich task was discussed with PSTs, explaining what we
338 wanted them to know and be able to do, how they were to get there and how they were to
339 demonstrate achievement in the end. The rich task used in this study was divided into three
340 aspects (see Figure 1); (1) unit design (scheme of work) by PSTs, (2) PSTs developing a scoring
341 rubric to assess the scheme of work, and (3) PSTs assessing a scheme of work using their
342 designed scoring rubric, providing a rationale for each score given. We felt it most appropriate
343 for us to assess this final piece allowing us to see the combined skills and knowledge PSTs had
344 gained from the modules. Key to this was the PSTs’ ability to self-assess their knowledge and its
345 application to practice by providing a rationale for their scoring decisions that reflected the
346 alignment between curriculum, assessment and instruction.

347 During seminar time for each module, similar to Sockman and Sharma’s (2008) practice,
348 PSTs were required to discuss, construct and agree on an assessment tool and scoring criteria to

349 be used to score the scheme. The scheme could be completed for any content area and was to suit
350 either a first, second or third year group of students (11 to 14 year olds). PSTs worked in small
351 groups on one element of the scheme design guidelines (e.g., big picture goal) in a bid to
352 construct appropriate scoring criteria aligned with concepts being learned for that element.
353 However, dissimilar to Sockman and Sharma's (2008) creation of a rubric, PSTs were given
354 ample opportunity to offer feedback to other groups working on other elements of the scheme
355 design guidelines. It was reinforced to PSTs that the rubric was a representation of the criteria
356 and expectations in completing the rich task / scheme design and not, as commonly perceived by
357 undergraduate students, a tool for satisfying faculty members' demands (Andrade & Du, 2005).
358 During autumn examinations PSTs used their agreed assessment tool (Table 2) to evaluate and
359 score their own scheme design, providing their rationale for each score given. Key to this was the
360 PSTs' ability to provide a rationale for their scoring decisions that reflected the alignment
361 between curriculum, assessment and instruction. The scoring rubric in Table 3 was completed by
362 both instructors assessing PSTs' responses to their perception of the extent to which they had
363 fulfilled their agreed scoring rubric criteria. This allowed the instructors to identify patterns of
364 student learning.

[Insert Tables 2 & 3 here]

366 4.3 Focus Group Interviews

367 Focus groups provided a means by which to reinforce or question PSTs' perceptions and
368 opinions related to the constructivist pedagogy promoted by the teacher educators. In an attempt
369 to gain PSTs' perceptions of the rich task to facilitate their learning and understanding of
370 instructional alignment, four focus group interviews were conducted across the first and second
371 year of the project. Focus groups can provide information about a range of ideas and perceptions
372 that individuals have about certain issues. They can also help to illuminate the differences in
373 perspective between groups of individuals. One of the distinct features of focus-group interviews

374 is its group dynamics hence the type and range of data generated through the social interaction of
375 the group are often deeper and richer than those obtained from one-to-one interviews (Krueger &
376 Casey, 2000). From each year, two focus groups of four and three PSTs respectively were
377 completed, with PSTs volunteering to be involved at the conclusion of their one-year Graduate
378 Diploma program. Focus groups ranged from 40 minutes to 60 minutes. The focus groups were
379 facilitated each year in a teaching classroom by an independent teacher educator and researcher
380 visiting the program. It was thought that the use of an independent facilitator would reduce the
381 possibility of students providing responses that might meet instructor expectations (a form of
382 studentship) or influence the receipt of good grades (Graber, 1991). PSTs were prompted to
383 engage with questions related to (1) their initial reaction to the rich task, (2) the extent to which
384 modules prepared them to undertake the rich task, (3) what they learned and achieved through
385 the rich task process and (4) ideas that they had for improving the modules and related content in
386 the future. The facilitator encouraged all PSTs to comment in an attempt to preclude any students
387 who might dominate the discussion. All focus groups were audiotaped and transcribed.

388

389 **5. Data Analysis**

390 Data were analyzed inductively (Patton, 1990; Strauss & Corbin, 1990) which relies on
391 the constant comparative method (Rubin & Rubin, 1995). Carter's (2008) conceptual framework
392 of the integration between the three components of instructional alignment, i.e., curriculum,
393 evaluation/assessment and instruction, was used to examine PSTs' understanding of the
394 alignment of goals, assessment, teaching strategies and learning experiences. Analyses of the
395 study data consisted of three phases of coding: open, axial and selective (Strauss & Corbin,
396 1990). Open coding involved taking data (rich task analysis and focus group transcriptions) and
397 segmenting them into categories of information, e.g., responses to the rich task categories were
398 each analysed and compared across cases. This was followed by axial coding, in which

399 connections were made among categories, e.g., overall, how was backward design used? The
400 final phase was selective coding, in which the researchers related the central phenomena to other
401 categories and validated the relationships, e.g., patterns of learning were determined about
402 instructional alignment and specifically PSTs' understanding between curriculum, assessment
403 and instruction.

404 Data from the rich task scoring rubric (see Table 4) was clearly associated to common
405 elements /criteria related to the task, i.e., big picture goal, big picture assessment, area of study,
406 curriculum model, concept map, specific learning outcomes, teaching strategies, modes of
407 assessment and alignment. The first two authors were responsible for grading the submitted rich
408 tasks (Table 3) and subsequently kept a log of the extent to which each PST assessed and scored
409 their own work. In reading individual submissions carefully thoughts and / or perceptions from
410 PSTs related to their responses to each element of the rich task were identified in relation to
411 instructional alignment and could then be discussed across cases. The first and second authors
412 moderated a sample of each other's grading as is common practice for submitted course work.

413 Focus group interview responses were analyzed in relation to the PSTs' engagement
414 with the instructional alignment process. Common themes and patterns were identified by the
415 third author, aided by the four questions that were shared earlier. Triangulation within and across
416 the focus groups was employed to cross check responses, allowing evidence to be confirmed or
417 disconfirmed and interpreted. The first and second author each moderated one set of focus
418 groups from year one or year two of the study to prompt any further analysis that may have been
419 less evident to the third author but more obvious to the two authors involved in the delivery of
420 the modules.

421 It was made clear to the group of PSTs that what we hoped to gain from the experience of
422 evaluating their experiences, perceptions and opinions was to improve future employment of
423 constructivist pedagogies to enhance PSTs' associated learning experiences. While the topic of

424 study, i.e., to explore the extent to which the constructivist pedagogies employed by teacher
425 educators assisted PSTs in their understanding and construction of knowledge about instructional
426 alignment, may not be sensitive in itself, there is no denying that there was a likely interplay
427 between what the PSTs were prepared to divulge and what they thought we wanted to hear
428 (Graber, 1991). This was complicated by the implications of the researchers also being the
429 teacher educators working with the PSTs on a weekly basis. We are also cognizant that the
430 favoured PST comments may bias those PSTs who were more capable of communicating,
431 through written responses and verbally, their understanding (or not) of the constructive
432 pedagogies being utilized (Kvale & Brinkman, 2006). Hence, we acknowledge perceptions and
433 opinions from some PSTs may be privileged. We by no means attempt to convey privileged truth
434 claims from what the PSTs did share but rather make an attempt to identify and challenge the
435 principles of constructive pedagogies to enhance PSTs' learning experiences.

436

437 **6. Results**

438 The purpose of this study was to explore the extent to which the constructivist pedagogies
439 employed by teacher educators assisted PSTs in their understanding and construction of
440 knowledge about instructional alignment. **The results are subsequently aligned with three**
441 **construct that contribute to such exploration.** These are (1) how the coursework undertaken by
442 PSTs and the constructivist pedagogies employed in teacher education influenced PSTs' learning
443 to teach, (2) the challenges constructive pedagogies posed for PSTs and suggestions from PST
444 on refining and extending constructive pedagogies and (3) how PSTs experienced and viewed
445 instructional alignment in practice, and the extent to which they were able to use their developing
446 skill in designing worthwhile and enduring knowledge that would be viewed as realistic to young
447 people. Pseudonyms are used for each PST and quotes are presented either as they were written
448 or spoken. Focus group data is denoted by FG and quotes shared from PSTs formal responses to

449 the rich task assignment are denoted as ‘script’.

450

451 6.1 Development of PST learning and an association with learning to teach

452 When considering their own achievement as a result of the rich task **and the pedagogies**
453 **we employed to introduce and develop their own understandings of the task, we found** that a
454 number of PSTs understood the alignment process in developing content through a scheme as a
455 result of this approach, but not without challenges. After taking part in **focused readings,**
456 **individual and group reflections, consulting with a critical friend or taking part in probing peer**
457 **and group-discussions one PST noted,**

458 *I had learned more that way [rich task] than if I actually was sitting reading a book, trying*
459 *to memorise, ‘Okay, a goal has to be achievable, clear ...’ (...)* *If you were sitting learning*
460 *definitions (...) ‘What’s an assessment?’, ‘What’s an aim?’ so for me it [rich task] was far*
461 *easier that way because I knew exactly what I was looking for. (Lorna, FG 1)*

462 *It was like a jigsaw (...) the toughest thing for me was getting the instructional alignment to*
463 *gel with all the other pieces, to actually understand that and piece it all together (...) once it*
464 *was done you could see how the pieces were fitting. (Marie, FG 2)*

465

466 *I wouldn’t have fully understood the whole alignment and the whole everything fitting into*
467 *each other if I hadn’t done the rich task. (Therese, FG 1)*

468 **As a result of** being introduced to instructional alignment **through varied types of peer**
469 **interactions, group case analysis and reflective activities, PSTs highlighted how these pedagogies**
470 **provided the foundation for their growth and developing understanding of the concepts (Fosnot,**
471 **1996). One PST** admitted that **initially** he would have approached the task in one way; *‘Pick a*
472 *goal and then try to see ‘Look, how can I achieve that?’ rather than saying ‘Look, what do I want*
473 *these kids to achieve?’ and then work backwards from that’* (Martin, FG 1). Ashlee admitted, *‘I*

474 would have put down the objectives, but I would have left it hanging rather than linking them
475 with (...) teaching strategies' (FG 2)'.
476

476 PSTs frequently indicated that the rich task and associated pedagogies and learning
477 experiences allowed them to develop a template for future planning, acknowledging that the
478 work they had completed provided them with a resource they could use when teaching in
479 schools;

480 *It wasn't just like an exam paper where you look at it, you never see it again, it goes straight*
481 *in the bin (...) It was something that you had that we were going to use (...) it was our best*
482 *weapon going into teaching practice. (Henry, FG 1)*
483

484 *The scheme of work I use now for doing all schemes of work is that one, so I work through*
485 *the process off that. You know, so I'm able to go back and have the headings and have*
486 *everything and fit them all in. (Therese, FG 1)*

487 Thus the rich task strategy and associated constructivist pedagogies to support it was
488 useful in developing a template for instructional alignment.

489 6.2 The challenge of constructivist pedagogies and suggestions on extending constructivist
490 pedagogies

491 In an attempt to bridge the gap between theory and practice we explored the use of
492 pedagogies that caused PSTs to explore their own current knowledge and begin to link new
493 concepts and principles in ways that made sense to them, even though they initially questioned
494 the practice. For example, the use of a scoring rubric learning task that PSTs, as a cohort, were to
495 construct, agree and use to assess their own, and their peers' work, heightened the PSTs'
496 apprehension towards such constructivist pedagogy, expressing fear of the unknown;

497 *It was just different to anything we've ever done before (...) Having to mark your own work,*
498 *it means that you have to be a total expert and know everything about what you were talking*
499 *about and to have a reason for everything. (Miriam, FG 1)*

500
501 *It was so different to anything that I had ever done before. You know, I would never have*
502 *designed what I was going to assess myself on before. (Lorna, FG 1)*

503
504 *We could decide on what we were actually being assessed on and it was a bit weird because*
505 *usually we're being told what we're being assessed on. (Ashlee, FG 2)*

506 **Despite the PSTs apprehension, we attempted to challenge our students, hold them accountable**
507 **for exploring and discovering new knowledge through what we perceived were challenging**
508 **constructivist pedagogies (Brooks et al, 1993). We refrained from coming to the rescue and**
509 **providing answers when they struggled preferring to encourage, prompt and push them beyond**
510 **their normal comfort zone. The result was PSTs beginning to take responsibility for their own**
511 **learning.** PSTs did convey an appreciation for involvement in constructing and agreeing on the
512 scoring rubric as a group, noting an extent of responsibility for their own learning. A number of
513 PSTs noted concern that being too self-critical in the assessment process may result in them
514 receiving a low grade. This was an inaccurate perception as PSTs were graded on the extent to
515 which they had accurately presented a rationale for the self-allocated score for each element of
516 the scheme. We suspect such an inaccurate perception arises through PSTs having limited
517 exposure to constructivist pedagogies that encourage them to be active, social and creative
518 learners.

519 While there was an appreciation that the two modules were closely linked with respect to
520 encouraging instructional alignment, there was a suggestion that combining the two modules
521 may have made it easier for PSTs to develop their understanding of instructional alignment;

522 *Oh yeah, they were doing alignment in Ann's, but it was separate to what we were doing with*
523 *Deborah, so then we weren't realising that the teaching strategies we were doing with*
524 *Deborah is actually included in the alignment (...). Yeah, it would have been better if they*
525 *were combined, because they linked off each other, but we weren't aware that they linking off*
526 *each other. (Miriam, FG 1)*

527 Ashlee stated that while instructional alignment was covered in both modules, it was towards the
528 end of the semester that the elements appeared to become '*glued together*' (FG 2). PSTs
529 highlighted and appreciated the continuous learning process that the modules promoted,
530 continually being encouraged to '*chop and change*' their scheme where appropriate. PSTs
531 *reported learning from the various pedagogies we utilised, especially those that caused them to*
532 *think about and reflect on the process of alignment.* This is evident in Martin's comment where
533 he spoke of instructional alignment and the thought process required of them in developing
534 practice, noting;

535 *We has [have] to think about exactly where we go and not just be thinking about a goal and*
536 *then be thinking about assessment and then be thinking about your content but actually have*
537 *to have everything together. (Martin, FG 1)*

538 As the modules progressed and PSTs were continually being reminded of instructional
539 alignment, there was an acknowledgment that once the rubric was complete there was a greater
540 understanding of how it would direct PSTs' pursuit of instructional alignment within the rich
541 task;

542 *I remember at the time thinking it [the rubric] was a good idea for the scheme of work, to*
543 *take things off the rubric and make sure they were in the scheme of work' (Matthew, FG 2)*

544

545 *With the rich task and with the rubric, you actually had to look at each piece and make sure*
546 *that it did align and you could see the progression from one stage to the other and it all*
547 *linked in together and wasn't just in different parts of the scheme. (Martin, FG 1)*

548 Martin expanded on his comment **after focused readings and challenges from his peers**
549 **caused him to think differently and develop new insights on his learning**, admitting that in using
550 the rubric alongside his scheme with peer assessment he noticed that the elements of his scheme
551 *'weren't really linking in and there wasn't alignment'* (FG 1).

552 **While throughout the modules the PSTs appeared to value different pedagogies and**
553 **ultimately recognized that what they learned from one activity might be quite different to the**
554 **insights gained by their peers, they** provided a number of suggestions on how to extend
555 constructivist pedagogies to better meet their needs and development. They suggested we share
556 examples of previously completed rich tasks at the beginning of the course. They wished to
557 maintain the practice of allowing them to prepare one component of an assessment rubric in pairs
558 (as this was helpful) and suggested the use of a jigsaw format (Aronson, 2008) to learn the other
559 components. They requested more extensive opportunities to grade/critique their own and peers'
560 schemes using a scoring rubric as this is required as part of the rich task, providing useful and
561 practical feedback. **Though they received and appreciated feedback, guidance and constructive**
562 **criticism from peers and instructors**, they would have liked **formal feedback and assessment** on
563 the scheme and its design **from the instructors. This learning from, and interacting with, someone**
564 **viewed as an expert is in line with constructivist pedagogy and worth consideration.** The PSTs
565 suggested combining the two modules and more consistency in introducing learning intentions
566 at the start of each class to contextualise the focus of the lecture and how it 'fits' in the program
567 of study for the related modules. The PSTs also felt it would have been helpful to prepare them
568 at the start of the modules for the amount of time learning the instructional alignment process

569 takes to fully understand and be able to achieve, and ultimately to provide sufficient time for
570 PSTs to revisit their schemes before the end of semester.

571

572 6.3 Facilitating an understanding of instructional alignment

573 The rich task asked PSTs to design a scheme of work, develop an aligned scoring rubric,
574 and then assess their own scheme. The assessment of the final piece, i.e., their assessment of
575 their own work, allowed us to see the combined skills and knowledge PSTs had gained from the
576 modules. It appeared that the PSTs gained insight into the design process through experiencing
577 and reflecting on their own practice in pair and group discussions. Evidence of this was the
578 PSTs' ability to provide a rationale for their scoring decisions that reflected the alignment
579 between curriculum, assessment and instruction.

580 Table 5 provides an overview of the scores given to PSTs on how accurate we felt they
581 assessed and scored their schemes of work, paying particular attention to the rationale they
582 provided for the score given, and not our view of the scheme per se.

583 [Insert Table 5 here]

584 7. Scheme of Work

585 There are two particular components of the scheme of work that are pertinent to the focus
586 of our paper. Firstly, the PSTs' ability to engage with the concept and application of instructional
587 alignment (denoted as 'Alignment' in Table 5) allows us to determine the extent to which PSTs
588 were able to clearly articulate how/why they believed all aspects of the scheme of work were
589 instructionally aligned. Secondly, PSTs' analysis of the teaching strategies (denoted as 'Teaching
590 strategies' in Table 5) allows us to examine the extent to which PSTs provided an appropriate set
591 of learning experiences and instructional strategies to progress toward the learning outcomes.
592 Interestingly, both items were scored relatively low by the teacher educators with regards to the
593 rationale PSTs conveyed for the way in which they had addressed each item.

594

595 7.1 Application of instructional alignment

596 PSTs ability to design lessons that align the learning goal with the assessment and then
597 use appropriate instructional strategies and learning experiences to allow the students to be
598 successful was quite variable. Some PSTs gained a deeper understanding of pedagogical
599 practices by questioning and probing one another in an environment that provided freedom to
600 explore while being held accountable for their own developing practices. For example, Ciaran
601 commented that, *'the process of matching goals to assessment and to instructional strategies*
602 *focuses on three questions (Siedentop & Tannehill, 2000). What do I want them to achieve (big*
603 *picture goal)? How will I know they have achieved it (assessment)? How will I get them their in*
604 *the most effective way (teaching strategies)? Group challenges helped me answer this question'*
605 (script 8). It is however worrying that a few PSTs were just developing the notion of
606 instructional alignment, with Declan failing to articulate what the concept means in practice, *'I*
607 *failed to discuss the alignment between the goals, teaching strategies and assessment. I can see*
608 *them linked in the scheme but did not discuss what or how this was achieved'* (script 13). A few
609 PSTs demonstrated alignment well in the scheme and rationale and several were able to
610 articulate understanding of the alignment concept, and demonstrate it in the scheme. Carmel
611 accurately suggested that *'instructional alignment is deciding what you are going to teach and*
612 *then teaching and assessing that'* (script 23), and then continues to do so in her scheme and in
613 her scheme assessment, being specific and clear in discussing her alignment of each aspect of the
614 scheme. A few PSTs were not able to indicate why they scored themselves lower, or what was
615 missing in making the scheme more aligned. One PST failed to describe alignment or determine
616 if it was present in the scheme (script 9). In a couple of cases the PST expected us to 'see' the
617 alignment without the need to explain what it meant or how they view it, such as Sonya who

618 stated, *'As you can see through the scheme all areas were looked at in depth and aligned*
619 *accordingly'* (script 11).

620 When analysing instructional strategies and viewing PSTs' comments, it was interesting
621 to us that most of the PSTs did not link their learning or lack of learning to the pedagogies we
622 employed to aide them. This is a problematic for us in that our analysis of PSTs' choice of
623 instructional strategies indicated a mixed ability among the PSTs to design appropriate strategies
624 and explain how and why they might be effective. Yet, we do not know if it was the content or
625 the learning experiences we provided that were the issue in their ability to select appropriate
626 strategies. There were a few instances where instructional strategies and learning experiences
627 were chosen and described yet did not appear to match or be linked to learning outcomes. This
628 suggests that PSTs may have randomly cut and paste from handouts or picked activities they had
629 enjoyed but had not connected to outcomes of the specific lesson. Not linking instructional
630 strategies to the specific scheme of work is apparent in Casey's script when he listed four
631 strategies (small group work, teaching through questions, student mediated learning, and
632 problem solving) and reproduces the descriptions provided in lectures (script 2). On the other
633 hand, Therese provides detailed and specific rationale for her choice of learning experiences and
634 aligned instructional strategies to meet the outcomes students are striving to achieve (script 3).
635 Interestingly, some PSTs designed assessment tools that were also learning experiences, yet
636 these were not mentioned in the instructional strategies section of the scheme, encouraging us to
637 question whether they understood the concept of an educative assessment that might be one
638 instructional component of a lesson. Other PSTs provided limited discussion of instructional
639 strategies to demonstrate understanding and lacked detail to clarify how strategies would assist in
640 student development of learning outcomes. Some PSTs used appropriate language yet did not
641 explain how such terms were linked to student learning. This is apparent in Martin's comment,
642 *'teacher focused activities made sure that safety and discipline were maintained'* (script 10) as

643 he does not discuss what teacher-focused activities include or how they achieve what he
644 suggests.

645

646 **8. Discussion and Conclusion**

647 The purpose of this study was to explore the extent to which the constructivist
648 pedagogies, associated with the rich task, employed by teacher educators assisted PSTs in their
649 understanding and construction of knowledge about instructional alignment. Through peer
650 interaction in the form of discussion with critical friends, probing and challenging one another's
651 insights and interpretations, group problem solving and sharing of outcomes through various
652 pedagogical strategies such as the jigsaw and world café allowed PSTs to develop or struggle
653 with the construction of their knowledge of instructional alignment. Our practice of criterion
654 referenced instruction (Cohen, 1987) encouraged the tasks that were to be learned to be the same
655 ones that are taught and ultimately measured (Tannehill, 2001), not only in the PETE program
656 but also in providing PSTs with constructivist pedagogies they could transfer to learning to teach
657 as novice teachers.

658

659 While word limits allowed us to unpack only two items from the scheme of work, Table
660 5 conveys that PSTs were competent (exemplary or strong) at setting a big picture goal and
661 identifying learning outcomes for student learning. They demonstrated skill (strong to
662 acceptable) in identifying the area of study to which their scheme best fit, selecting the content to
663 be learned through a concept map, designing appropriate instructional strategies to facilitate
664 learning and developing assessment tools to reinforce and extend that learning. PSTs displayed a
665 mixed range of skills at selecting an appropriate curriculum model to serve as the framework for
666 the scheme of work and student learning. These areas of strength and deficiency serve to guide
667 the teacher educators in their revision of the two modules as they are combined into one module

668 that provides a more sequential and progressive introduction to learning and practicing concepts
669 of instructional alignment.

670 PSTs conveyed initial confusion about the rich task assessment expectations and
671 difficulty in making the connections between the two modules and their content. As the semester
672 progressed, the PSTs moved from feelings of fear and apprehension to being confident as they
673 recognized their own development. This recognition was a result of their experience with the rich
674 task learning process that included both the design and the self and peer-assessment of the
675 instructional alignment scheme development. It was clear that PSTs had perhaps not been
676 previously exposed to such constructivist pedagogies that encouraged them to be responsible for
677 their own assessment criteria and to be directly assessed on what they had opportunities to
678 overtly practice throughout the modules. **We gained insight into PSTs' learning as a result of
679 self-assessment. Similar to Ross and Bruce's (2007) study, these PSTs found that self-
680 assessment served to confirm their learning, and supported their current and developing beliefs
681 and practices while being prompted to examine alternatives to improve teaching and learning.
682 Ross and Bruce (2007) also explore the use of peer interaction as a means to challenge peer
683 perspectives, encourage sharing of ideas and feedback to encourage change, and even pose
684 questions that may contradict and/or support the instructor. This type of challenge may cause the
685 PST to rethink their stance on a topic and build on existing knowledge to develop alternative
686 perspectives.**

687 Ultimately, the PSTs understood and valued the process of instructional alignment while
688 also providing suggestions on how to make the modules more useful in facilitating their learning
689 of the alignment process. Such suggestions encourage us to revisit Carter's (2008) conceptual
690 model of an aligned instructional program, and re-examine the extent to which we can more
691 deliberately convey the integration between the three components of instructional alignment,
692 particularly related to the way in which the curriculum for both modules is constructed.

693 This study is the first step in our development of one aspect of the Graduate Diploma in
694 Physical Education program. We were able to determine how knowledge for teacher education
695 can be generated at a local level to address the unique and situational issues embedded in own
696 settings and be generative for PST learning. We intend to continue the partnership format we
697 have established with the PSTs, and take their advice attempting alternate strategies and formats
698 to more fully capture their needs. This is not dissimilar to the concept of ‘communicative
699 alignment’ (Knewstubb & Bond, 2008) which conveys the relationship between faculty and
700 students’ understandings of the same teaching-learning event. Consistent with Shulman’s (1999)
701 notion that the scholarship of teaching is focused on student learning as much as teaching, we
702 considered the instructional strategies employed in these modules as a means of allowing the
703 PSTs to be productively engaged in their own learning, and learning to teach, thus reinforcing
704 their understanding.

705 This study could be envisaged as the first ‘chain’ in what Cochran-Smith (2005) terms the
706 ‘chain of evidence’ concerned with providing empirical evidence to link constructivist teacher
707 education to student learning. That is, while this study initiates an interest in teacher preparation
708 programs and PSTs’ learning, examining the more immediate effects of teacher education
709 coursework on PSTs’ knowledge, further research is necessary to not only establish how
710 instructional alignment affects PSTs’ learning and their practices in classrooms but also what and
711 how much their students learn from associated practices. There is a continuing concern
712 internationally in teacher education (Feiman-Nemser, 1990) and PETE (O’Sullivan, 2003) with
713 establishing the extent to which the outcomes of teacher learning contribute to student learning.

714 In reporting research specific to the use of constructivist perspectives on teacher learning
715 in physical education, Tsangaridou (2006) concluded that “teacher knowledge is experiential,
716 procedural, situational and particularistic” (p. 511), which suggests the need for innovative,
717 reflective, and thought provoking pedagogies be employed by teacher education to assist

718 teachers in their construction of teacher knowledge and practice. Tsangaridou (2006) suggests
719 that, “there are indications in the literature that greater thought needs to be given on what
720 actually teachers know, how they come to know, and/or what they think they need to know about
721 teaching and learning. More studies to capture the collective understanding and orientations of
722 the nature and content of teacher knowledge are definitely needed in the near future” (p. 511).

723 We have become more aware of the pedagogical tools we employed that were most
724 effective in stimulating, motivating and promoting learning among our PSTs. We recognize that
725 not all the strategies we employed will be effective in all settings yet suspect that they can be
726 adapted and modified to meet the needs of developing teachers internationally in various
727 contexts and cultures. As Avalo (2011) suggests, “the effort to construct models of teacher
728 development is also a way of searching for unifying threads in the midst of diversity” (p. 17).

729

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1 **Preparing physical education pre-service teachers to design instructionally aligned lessons**
2 **through constructivist pedagogical practices**

3
4 **Abstract**

5 Examining how teacher education influences preservice teachers' (PSTs) application of content
6 knowledge, decision making when planning for teaching, creation of innovative teaching
7 practices and design of aligned instruction, has significant implications for understanding
8 learning to teach. The purpose of this study was to explore the extent to which the constructivist
9 pedagogies (e.g., interactive community discussions, problem-solving, group challenges)
10 employed by teacher educators through the implementation of a rich task (Macdonald, Hunter &
11 Tinning, 2007) assisted PSTs in their understanding and construction of knowledge about
12 instructional alignment. Data collection employed rich tasks and focus group interviews with a
13 sample of 31 physical education teacher education (PETE) PSTs enrolled on a one-year Graduate
14 Diploma Physical Education programme. Data were analyzed inductively (Patton, 1990) using
15 the constant comparative method (Rubin & Rubin, 1995). Results revealed that PSTs varied in
16 their articulation of the various elements of instructional alignment that were captured in the rich
17 task. Through the use of such constructivist strategies as problem-solving, group discussions, and
18 critical friends, PSTs understood and valued the process of instructional alignment as they
19 moved from feelings of fear and apprehension to being confident in their own development.
20 Areas of strength and deficiency that were noted in the PSTs' attempts to design instructionally
21 aligned lessons will guide the teacher educators in revising programme components and their
22 own practice.

23
24 **Key Words**

25 Constructivist pedagogy, learning to teach, instructional alignment

26 Preparing physical education pre-service teachers to design instructionally aligned lessons
27 through constructivist pedagogical practices

28

29 **1. Introduction**

30 Teacher learning and learning how to teach is a major focus of most teacher education
31 programmes worldwide. Avalos (2011) contends that teacher learning should ultimately be
32 focused on student growth and represents a type of teacher professional development that begins
33 within initial teacher education and continues throughout a teacher's career. As a result of her
34 literature review on teacher professional development, she encourages teacher educators to
35 remember that learning to teach requires personal commitment, and a collective focus to
36 cooperate and challenge one another's beliefs and perspectives while considering options that
37 might improve practice. Organization for Economic Co-operation and Development (OECD)
38 recognises initial teacher learning as just one phase of the teacher learning continuum, albeit a
39 complex and challenging phase (OECD, 2005).

40 This study examines the extent to which our pedagogical practices as teacher educators
41 encouraged pre-service teachers' (PSTs') perspectives and dispositions towards learning to
42 teach, appreciating that there is a strong association between the design of the learning
43 environment and the quality of PSTs' experiences and their learning (Darling-Hammond, 1997).
44 More specifically, the purpose of this study was to explore the extent to which the constructivist
45 pedagogies employed by teacher educators assisted PSTs in their understanding and construction
46 of knowledge about instructional alignment. The study represents an effort to ground PST
47 learning in a particular set of experiences that promote meaningful engagement with, and
48 reflection on, the notion of instructional alignment as a practice of good teaching. In order to
49 frame our intentions of working with PSTs in meaningful ways to support their learning as
50 teachers, it is imperative that we engage with the complexity of learning to teach, constructivist

51 theory and associated pedagogies, and instructional alignment as a pre-requisite for worthwhile
52 and meaningful learning.

53

54 1.1 Learning to teach

55 Whether at the preservice or beginning teacher level, learning to teach is complex and
56 requires learning content, learning about learning, and learning about teaching. There is a wealth
57 of international research in general education and across all subject areas that examines learning
58 to teach and how a beginning teacher moves from a novice teacher to a competent, and even
59 expert, teacher. Some of this literature is focused on the types of knowledge needed to teach
60 (Loughran, 2006; Lowenberg-Ball, Hoover Thames, & Phelps, 2008; Rovegno, 1993; Shulman,
61 1986), the stages through which PSTs pass in their quest to become competent teachers (Furlong
62 & Maynard, 1995), and the phases of teacher socialisation that impact a teacher's development
63 (Lawson, 1987; MacPhail, O'Sullivan & Tannehill, 2010). Teacher education is responsible for
64 setting the stage for PSTs, and ultimately novice teachers, to work through these challenges
65 using different pedagogies, at different times, and with different learners. These pedagogies take
66 diverse forms and involve various learning theories and perspectives that guide learning
67 including behaviourist, cognitive, constructivist, social learning, and more recently complexity
68 theory, all of which offer diverse approaches for teaching practices.

69 When learning to teach, preservice and novice teachers are forced to negotiate the
70 relationship between learning how to teach and practicing teaching with young people in varying
71 contexts (Loughran, 2006). **How teachers' knowledge is developed is of critical concern to
72 teacher education internationally. If teacher education is to educate teachers to design and deliver
73 quality education programmes to impact student learning, they must recognise and acknowledge
74 how teachers construct knowledge, the conditions under which this learning is most effective and
75 the pedagogical strategies that might facilitate this knowledge development (Tsangaridou, 2006).**

76 An abundance of research has examined the process by which these inexperienced and
77 novice teachers learn to teach and the content considered essential for this teaching. This
78 includes content knowledge (Graber, 1995; Herold & Waring, 2009), pedagogical content
79 knowledge learned simultaneously with content knowledge (Shulman, 1986) and more recently
80 the idea of PSTs appreciating the flexibility of content when teaching (Darling-Hammond &
81 Snowdon, 2005; Loewenberg-Ball, 2000).

82 Recognising the importance of pedagogical content knowledge (PCK) in the design and
83 teaching of quality physical education, Tsangaridou (2006) summarised much of the research on
84 PCK in physical education. Findings that she reported as having important implications for
85 teachers' construction of PCK include: 1) PSTs' PCK is insufficient in today's school contexts
86 (Rovegno, 1992, 1993, 1994, 1995), 2) PSTs' content knowledge lacks developmental
87 appropriateness (Rovegno, 1994, 1995), 3) PSTs' use of PCK during teaching practice is linked
88 to level being taught, prior experience in using these pedagogies, interactions with and support
89 from cooperating teachers, and response received from pupils (Graber, 1995), 4) PCK may need
90 to develop following acquisition of more in-depth knowledge about teaching (Sebrin, 1995), 5)
91 PCK develops as a result of teachers willing to focus on analysing, adapting and revising their
92 own teaching practices (Griffin et al, 1996), 6) PCK can have a significant impact a PSTs
93 pedagogical practice (Tsangaridou, 2002), and 7) PSTs PCK develops as a result of what
94 McCaughtry and Rovegno (2003) refer to as the reality of the teaching context e.g., moving from
95 blaming students as opposed to recognising their own inadequacies and the complexity of motor
96 development, or ignoring students feelings and emotions by coming to terms with how emotions
97 can enhance student learning. Constructivist pedagogy emphasises the role of pedagogical
98 content knowledge and the ability to engage learners in knowledge construction.

99 Constructivist pedagogies influence on learning to teach

100 A constructivist approach to the teaching of teachers, prominent in teacher education is
101 based on the notion of using current knowledge and past experiences as the framework for
102 constructing new knowledge and new meaning (Behets & Vergauwen, 2006; Richardson, 1997;
103 Tinning, 2006). Use of constructivist pedagogies requires teacher education programmes to
104 redesign and reformat many of their practices to invite and utilize the individual and collective
105 voice of the PST (Rovegno, 2003; Winitzky & Kauchak, 1997). Kirk and Macdonald (1998)
106 encourage the use of constructivist approaches to teacher education suggesting that they provide
107 opportunities for critical, in-depth and important thinking about teaching and learning.

108 Constructivism suggests learning is experiential in that people create knowledge and
109 draw meaning from that knowledge through their own experiences and ideas (Dewey, 1933,
110 1998; Kolb, 1975). From a constructivist perspective, learning is both cultural and social
111 involving social interaction and collaboration with learning peers, as well as interaction with
112 more knowledgeable individuals within society (Biggs, 1996; Kuiper, Volman & Terwel, 2009;
113 Pontecorvo, 2007). For this experiential learning process to be sustained and developed,
114 Vygotsky (1978) argues that learners will progress from one educational task to more
115 challenging tasks only through improved self confidence in their ability to be successful in
116 various problem solving experiences. Brooks et al (1993), similarly, suggested that
117 constructivist pedagogies include 1) inspiring student initiative, 2) accepting student autonomy,
118 3) employing cognitive language to challenge critical thinking, 4) fostering independent thinking
119 and innovation by building on student responses, 5) developing knowledge construction by
120 challenging students to recognise prior learning, 6) provide interactive opportunities among
121 students, 7) encourage critical thinking and problem solving individually and collectively, and 8)
122 provide time, prompts, redirected questions and probing to push students to develop and
123 integrate new knowledge and construct their own meaning. Fosnot (1996) recommends five
124 principles of constructivism with implications for educational practice with which teachers and

125 teacher educators engage as they design learning experiences. He suggests that (i) learning is
126 developmental, (ii) learning requires cognitive dissonance where questioning facilitates learning,
127 (iii) reflexivity drives learning, (iv) community dialogue promotes thinking, and (v) through the
128 process of learning new conceptions of knowledge are often developed.

129 In their review of physical education research from a constructivist perspective, Rovegno
130 and Dolly (2009) stress that, ‘constructivism is a theory of learning and not a set of instructional
131 strategies’ (p. 243). As their education colleagues have done, they highlight the widely accepted
132 principles on which constructivism is based, i.e., learning is active, knowledge is socially
133 constructed, and learners create knowledge in relation to what they already know (Holt-
134 Reynolds, 2000). Constructivist pedagogy encourages knowledge fashioned by learners, taking
135 place in classrooms created as learning communities where learning occurs through peer
136 interaction, collaboration and student ownership of educational experiences (Azzarito & Ennis,
137 1996; Kirk and Macdonald, 1998). When referring to previous work, Hastie and Curtner-Smith
138 (2006) encourage teacher educators that, when using a constructivist approach to teaching
139 physical education, ‘students must be *active learners*, in that they perform tasks which involve
140 solving problems and making decisions; *social learners*, in that they formulate knowledge by
141 interacting with their peers; and *creative learners*, in that they discover and understand
142 knowledge by experimenting with the subject matter’ [authors’ emphasis] (p. 22).

143 An increased interest in constructivist theory and practices in physical education has
144 made an impact on teacher education programmes as they assist PSTs in developing their
145 teaching skills and knowledge. Brock, Rovegno and Oliver (2009) propose that two physical
146 education curriculum models, Sport Education and Teaching Games for Understanding, utilize
147 constructivist pedagogies that foster students making sense of their own learning. Examples of
148 these pedagogies include small group work (often in teams), responsibility (for self and team),
149 leadership (in the form of roles beyond player), problem solving (what skills to use when), and

150 decision making (making tactical decisions). Moreover, both of these curriculum models require
151 students to construct their own knowledge through social interaction with classmates (Rovegno
152 & Dolly, 2009). Light (2008) also encourages recognition that Teaching Games for
153 Understanding and Sport Education can be best understood through Lave and Wenger's (1991)
154 situated learning framework as reflected in a student centered team approach, critical thinking
155 and group problem solving. As with Light (2008), Rovegno (1998) argues that physical
156 education teachers need a strong understanding of constructivist principles if they are to
157 implement physical education effectively and allow students to achieve success.

158 Light (2008) highlights that constructivism has become a mainstay in the physical
159 education literature. He encourages physical educators to consider what has been termed
160 'complex learning theory' to convey what all constructivist approaches have in common, that is,
161 learning is a process, is student-centered, contextual, develops from experience, involves
162 interaction between the mind and the body, and is complex and unpredictable. Light (2008)
163 notes the prominent role of the body in complex learning theory and argues that this provides
164 physical educators the opportunity for 'reconceptualizing the teaching of physical education and
165 its place in the curriculum' (p. 28) to extend beyond acquisition of skills and to view learning
166 content more holistically and seldom linear.

167 Internationally, discussion of complex learning theory in physical education and
168 education is evident. In 2006, the Asia-Pacific Educational Research Association (APERA)
169 International Conference focused on the application of complex learning theory in curricular
170 reforms in Hong Kong, with Fong (2006a) suggesting implications of complex learning theory
171 for pedagogy and student learning. Perhaps the most critical of these implications is that schools
172 must adapt, adjust and even reinvent themselves to address the changing and evolving student
173 needs, while teacher education programmes must consider how to more effectively help PSTs to
174 work with young people in challenging and difficult settings (Fong, 2006b). Thorburn, Jess, and

175 Atencio (2011) describe their efforts to design a new vision of physical education pedagogy in
176 Scotland that requires teachers to move from what they term as a narrow ‘pedagogy of certainty’
177 to a more open ‘pedagogy of emergence’. This new ‘pedagogy of emergence’ reflects many of
178 the characteristics of complex learning theory, ‘emphasising teacher and student reflection, co-
179 construction of knowledge, active exploration and the unpredictable and non-linear nature of
180 learning to move’ (Jess, et al, 2011, p. 182). As noted by Jess et al (2011) ‘pedagogy of
181 emergence’ would be reflected by physical education teachers who facilitate student learning, are
182 co-creators of knowledge and in some respects co-learners in the learning process.

183 As PSTs learn to teach they learn to construct their understanding of instructional design
184 and alignment.

185

186 1.2 Instructional alignment

187 Constructivism and instructional alignment contribute to the concept of ‘constructive
188 alignment’, which represents a ‘marriage’ between a constructivist understanding of the nature of
189 learning, and an aligned design for teaching;

190 ‘a working version of constructivism can be integrated with instructional design at three
191 crucial points: the curriculum or unit objectives are clearly stated in terms of content specific
192 levels of understanding that imply appropriate performances, the teaching methods require
193 students to be placed in contexts that will likely elicit those performances, and the assessment
194 tasks address those same performances’ (Biggs, 1996, p. 361).

195 Teachers need to recognise that optimal learning environments need to be designed for
196 specific learning outcomes, student background and prior knowledge, and the context in which
197 learning will occur. Wiggins and McTighe (1998) encourage teachers to plan backwards from
198 the ‘big ideas’ they want students to learn, choose teaching strategies to facilitate students
199 reaching those ideas, and design assessment tools that will demonstrate students having achieved

200 success. This constitutes instructional alignment where goals, assessment, teaching strategies and
201 learning experiences are aligned, promoting richer learning for students. Instructional alignment
202 is a pre-requisite for worthwhile and meaningful learning, but should not be viewed as a panacea
203 in and of itself (Carter, 2008). In teacher education it is critical that we provide opportunities for
204 PSTs to (i) both experience and learn to design programmes that demonstrate alignment between
205 what we want students to know and be able to do, (ii) enhance the opportunities students receive
206 to learn, practice and explore what they have been taught and (iii) explore how we assess for
207 learning, in other words, we need to help PSTs search for their own understandings and how
208 these might align with those of their students.

209 Instructional alignment has had limited exposure in the physical education literature.
210 Where it has been examined, the interest has been attached to the increasing interest in student
211 learning as a result of (authentic) assessment and accountability (James, 2004; James et al., 2008;
212 Lund, 1992) and less with the perceptions that teachers and learners have of instructional
213 alignment. We propose modelling a specific form of pedagogical practice and associated
214 assessment utilized in physical education teacher education (PETE) that encapsulates our interest
215 as teacher educators to not only teach and model the practices of instructional alignment but also
216 to allow PSTs to live the experience.

217 We acknowledge that the relationship between the three components of instructional
218 alignment (learning goals, assessment, instructional strategies) is bidirectional (Chen &
219 McNamee, 2006). In practice, we use assessment activities to both enhance PSTs' learning and
220 to evaluate the effectiveness of our instruction. Subsequently, this directs the nature of
221 (revisiting) future curriculum activities with the result being, 'the pattern is no longer a linear
222 sequence with assessment preceding curriculum development. Instead, the pattern is a spiral with
223 each leading to the other in a continuous process' (Chen & McNamee, 2006, p. 125). We also
224 introduce design-focused evaluation, 'an approach that seeks to provide guidance in

225 systematically addressing questions to the issue of the links between curriculum designs and the
226 learning they elicit' (Smith, 2008, p. 644). That is, we pose questions to gain PSTs' perceptions
227 of the effectiveness of the learning experiences / tasks encouraged through our instructional
228 practices and intentions for facilitating the development of the assessed learning outcomes.

229

230 **2. Purpose of Study**

231 There is a dearth of research reporting how PSTs apply knowledge learned during teacher
232 education (Cochran-Smith, 2005). Examining how teacher education influences PSTs'
233 application of content knowledge, decision making when planning for teaching, creation of
234 innovative teaching practices and design of aligned instruction, has significant implications for
235 understanding learning to teach. The purpose of this study was to explore the extent to which the
236 constructivist pedagogies employed by teacher educators assisted PSTs in their understanding
237 and construction of knowledge about instructional alignment. It was important that we examine
238 how PSTs experienced and viewed instructional alignment in practice, and the extent to which
239 they were able to use their developing skill in designing worthwhile and enduring knowledge
240 that would be viewed as realistic to young people. We consider how the coursework undertaken
241 by PSTs and the constructivist pedagogies employed in teacher education influenced PSTs
242 learning to teach. Drawing on the work of Azzarito and Ennis (1996), Kirk and Macdonald
243 (1998), and Fosnot's principles (1996), the pedagogical strategies we chose to employ in these
244 modules included peer interaction, community discussions, problem solving tasks and group
245 sharing. Such strategies were utilised to foster PSTs drawing connections between their personal
246 experiences and beliefs, knowledge created through peer interaction, and PSTs taking
247 responsibility for collaboratively designed instructional materials. These interactive
248 constructivist pedagogies recognize the importance of teachers (teacher educators and PSTs)
249 working together in a community to develop skills, knowledge, expertise, share practices

250 (Fosnot, 1996). This collective learning has been encouraged through teacher communities and
251 networks and provides us with a foundation for some of the pedagogical practices we chose. We
252 explore how one teacher education programme encouraged and facilitated PSTs working as a
253 community of learners, drawing on the framework proposed by Hammerness, Darling-
254 Hammond, Bransford, Berliner, Cochran-Smith, McDonald, and Zeichner (2005), who state:
255 ‘New teachers learn to teach in a *community* that enables them to develop a *vision* for their
256 practice; a *set of understandings* about teaching, learning and children; *dispositions* about
257 how to use this knowledge; *practices* that allow them to act on their intentions and beliefs;
258 and tools that support their efforts.’ [authors’ emphasis] (p. 69).

259 This study developed from an interest in understanding the learning processes of our
260 PSTs and the impact of specific pedagogies utilized by teacher educators. The research is
261 significant because it will provide insight for all teacher educators, intent on examining their own
262 practices with PSTs, pedagogical aspects of their teacher education programmes, and how PSTs
263 interpret their learning experiences as they learn content, learn about learning and learning to
264 teach. (Rovegno & Dolly, 2009).

265

266 **3. Methodology**

267 3.1. Context of the PETE Program

268 The first two authors were involved in delivering two first-semester pedagogy-related
269 modules to two one-year cohorts undertaking a one-year Graduate Diploma program in physical
270 education (16 PST were enrolled in year one of the study and 15 PSTs in year two). In both year
271 groups there was a range of ages (20 to 44 years) and more females than males (11 females in
272 year one of the study and 12 in year two). These PSTs came from non-teaching undergraduate
273 programs in physical education or closely aligned areas of study in Ireland, the UK or the USA.
274 Successful completion of this Graduate Diploma program results in PSTs being qualified to

275 teach Irish post-primary physical education. The expectation of PSTs on entering the one-year
276 Graduate Diploma program in physical education is that they have gained a sufficient level of
277 expertise in subject content knowledge (both applied and theoretical), allowing the program
278 more scope to develop and examine specific, observable teaching skills associated with student
279 learning. Matching this with Feiman-Nemser's (1990) dominant conceptual orientations of
280 teacher education programs, the program reported here promotes more of a 'personal orientation'
281 (focus on the teaching competencies of PSTs) and less of an 'academic orientation' (focus on
282 subject matter of games, dance, gym, etc).

283

284 3.2. The Two Pedagogy-Related Modules

285 PSTs attended both modules for four hours each on a weekly basis over twelve weeks. The
286 first module, 'Physical Education Curriculum and Assessment' provided PSTs with an
287 opportunity to understand curriculum concepts and investigate the extent to which personal value
288 orientations and philosophies impact on curricular choices. Along with PSTs' understanding of
289 the (physical education) curriculum within the Irish school system, and what they believe is
290 worth learning, PSTs were guided in using selected curriculum and instruction models in their
291 own teaching. Understanding assessment and its relationship to learning goals and learning
292 experiences intended to allow PSTs to determine what is worth assessing and how this can be
293 done in a meaningful, relevant and effective way. The second module, 'Introduction to Teaching
294 in Physical Education' assisted the PST in making the connection to the alignment of teaching in
295 physical education, the teaching and learning process and effective instructional models and
296 teaching skills / strategies. PSTs learned about, and practiced, foundational management
297 strategies, how to design learning experiences and select instructional models / skills / strategies
298 for delivering developmentally and culturally relevant physical education experiences that

299 respect students as independent learners. Table 1 illustrates the learning outcomes, tentative
300 schedule of weekly themes and assessment points for each module.

301 [Insert Table 1 here]

302 In conjunction with these two modules, PSTs were assigned a post-primary school where
303 they taught on ten Mondays throughout 10 weeks of the semester. Throughout both modules and
304 the Monday teaching practice, PSTs reflected upon, critiqued and discussed their school
305 experiences with broader discussions of research on teaching in physical education and the role
306 of the physical educator in the delivery of an equitable, coherent, and culturally relevant physical
307 education in contemporary Irish schools. Within this reflection, and subsequent discussions,
308 there was a focus on how instructionally aligned lessons impacted student learning.

309 The content of both modules was delivered through learning experiences that matched what
310 we wanted PSTs to know and be able to do at the conclusion of the modules which demonstrates
311 our design of instructionally aligned modules of the content and pedagogical skills we wanted
312 our PSTs to learn. Assessment across these two modules is both formative and summative,
313 illustrating our efforts of allowing PSTs to ‘live’ and learn the process of instructional alignment.

314

315 **4. Data collection**

316 The purpose of this study was to explore the extent to which the constructivist pedagogies
317 employed by teacher educators assisted PSTs in their understanding and constructions of
318 knowledge about instructional alignment. In a bid to examine how PSTs’ experienced and
319 viewed instructional alignment in practice, data collection employed the use of a ‘rich task’ and
320 subsequent rich task scoring rubric related to the specific pedagogy used with PSTs. In addition,
321 focus groups were designed to elicit PST perceptions of the constructivist pedagogy.

322

323 4.1. Rich task

324 Constructivist pedagogies are explored in this study through the notion of the ‘rich task’,
325 derived from the work of Education Queensland (Cooper, Nuyen & Baturu, 2003; Luke, 1999;
326 Macdonald, Hunter & Tinning, 2007). The rich task presents substantive, real problems for the
327 students to solve, based on a range of learning outcomes, and may be used as an organizational
328 framework for the design of a unit of work (MackPhail & Halbert, 2010). The task is deemed to
329 be ‘rich’ when it is authentic for the student and relevant to the learning outcomes in question. It
330 should also contain 1) transparent criteria and standards, 2) encompass more than one learning
331 outcome, 3) involve acquiring, applying and evaluating knowledge, and 4) provide opportunities
332 for students to demonstrate subject knowledge, skills and understanding (MacPhail & Halbert,
333 2010).

334

335 4.2 Rich Task Scoring Rubric

336 The rich task was a way to examine the PSTs’ learning of instructional alignment through
337 authentic and practical application. The rich task was discussed with PSTs, explaining what we
338 wanted them to know and be able to do, how they were to get there and how they were to
339 demonstrate achievement in the end. The rich task used in this study was divided into three
340 aspects (see Figure 1); (1) unit design (scheme of work) by PSTs, (2) PSTs developing a scoring
341 rubric to assess the scheme of work, and (3) PSTs assessing a scheme of work using their
342 designed scoring rubric, providing a rationale for each score given. We felt it most appropriate
343 for us to assess this final piece allowing us to see the combined skills and knowledge PSTs had
344 gained from the modules. Key to this was the PSTs’ ability to self-assess their knowledge and its
345 application to practice by providing a rationale for their scoring decisions that reflected the
346 alignment between curriculum, assessment and instruction.

347 During seminar time for each module, similar to Sockman and Sharma’s (2008) practice,
348 PSTs were required to discuss, construct and agree on an assessment tool and scoring criteria to

349 be used to score the scheme. The scheme could be completed for any content area and was to suit
350 either a first, second or third year group of students (11 to 14 year olds). PSTs worked in small
351 groups on one element of the scheme design guidelines (e.g., big picture goal) in a bid to
352 construct appropriate scoring criteria aligned with concepts being learned for that element.
353 However, dissimilar to Sockman and Sharma's (2008) creation of a rubric, PSTs were given
354 ample opportunity to offer feedback to other groups working on other elements of the scheme
355 design guidelines. It was reinforced to PSTs that the rubric was a representation of the criteria
356 and expectations in completing the rich task / scheme design and not, as commonly perceived by
357 undergraduate students, a tool for satisfying faculty members' demands (Andrade & Du, 2005).
358 During autumn examinations PSTs used their agreed assessment tool (Table 2) to evaluate and
359 score their own scheme design, providing their rationale for each score given. Key to this was the
360 PSTs' ability to provide a rationale for their scoring decisions that reflected the alignment
361 between curriculum, assessment and instruction. The scoring rubric in Table 3 was completed by
362 both instructors assessing PSTs' responses to their perception of the extent to which they had
363 fulfilled their agreed scoring rubric criteria. This allowed the instructors to identify patterns of
364 student learning.

[Insert Tables 2 & 3 here]

366 4.3 Focus Group Interviews

367 Focus groups provided a means by which to reinforce or question PSTs' perceptions and
368 opinions related to the constructivist pedagogy promoted by the teacher educators. In an attempt
369 to gain PSTs' perceptions of the rich task to facilitate their learning and understanding of
370 instructional alignment, four focus group interviews were conducted across the first and second
371 year of the project. Focus groups can provide information about a range of ideas and perceptions
372 that individuals have about certain issues. They can also help to illuminate the differences in
373 perspective between groups of individuals. One of the distinct features of focus-group interviews

374 is its group dynamics hence the type and range of data generated through the social interaction of
375 the group are often deeper and richer than those obtained from one-to-one interviews (Krueger &
376 Casey, 2000). From each year, two focus groups of four and three PSTs respectively were
377 completed, with PSTs volunteering to be involved at the conclusion of their one-year Graduate
378 Diploma program. Focus groups ranged from 40 minutes to 60 minutes. The focus groups were
379 facilitated each year in a teaching classroom by an independent teacher educator and researcher
380 visiting the program. It was thought that the use of an independent facilitator would reduce the
381 possibility of students providing responses that might meet instructor expectations (a form of
382 studentship) or influence the receipt of good grades (Graber, 1991). PSTs were prompted to
383 engage with questions related to (1) their initial reaction to the rich task, (2) the extent to which
384 modules prepared them to undertake the rich task, (3) what they learned and achieved through
385 the rich task process and (4) ideas that they had for improving the modules and related content in
386 the future. The facilitator encouraged all PSTs to comment in an attempt to preclude any students
387 who might dominate the discussion. All focus groups were audiotaped and transcribed.

388

389 **5. Data Analysis**

390 Data were analyzed inductively (Patton, 1990; Strauss & Corbin, 1990) which relies on
391 the constant comparative method (Rubin & Rubin, 1995). Carter's (2008) conceptual framework
392 of the integration between the three components of instructional alignment, i.e., curriculum,
393 evaluation/assessment and instruction, was used to examine PSTs' understanding of the
394 alignment of goals, assessment, teaching strategies and learning experiences. Analyses of the
395 study data consisted of three phases of coding: open, axial and selective (Strauss & Corbin,
396 1990). Open coding involved taking data (rich task analysis and focus group transcriptions) and
397 segmenting them into categories of information, e.g., responses to the rich task categories were
398 each analysed and compared across cases. This was followed by axial coding, in which

399 connections were made among categories, e.g., overall, how was backward design used? The
400 final phase was selective coding, in which the researchers related the central phenomena to other
401 categories and validated the relationships, e.g., patterns of learning were determined about
402 instructional alignment and specifically PSTs' understanding between curriculum, assessment
403 and instruction.

404 Data from the rich task scoring rubric (see Table 4) was clearly associated to common
405 elements /criteria related to the task, i.e., big picture goal, big picture assessment, area of study,
406 curriculum model, concept map, specific learning outcomes, teaching strategies, modes of
407 assessment and alignment. The first two authors were responsible for grading the submitted rich
408 tasks (Table 3) and subsequently kept a log of the extent to which each PST assessed and scored
409 their own work. In reading individual submissions carefully thoughts and / or perceptions from
410 PSTs related to their responses to each element of the rich task were identified in relation to
411 instructional alignment and could then be discussed across cases. The first and second authors
412 moderated a sample of each other's grading as is common practice for submitted course work.

413 Focus group interview responses were analyzed in relation to the PSTs' engagement
414 with the instructional alignment process. Common themes and patterns were identified by the
415 third author, aided by the four questions that were shared earlier. Triangulation within and across
416 the focus groups was employed to cross check responses, allowing evidence to be confirmed or
417 disconfirmed and interpreted. The first and second author each moderated one set of focus
418 groups from year one or year two of the study to prompt any further analysis that may have been
419 less evident to the third author but more obvious to the two authors involved in the delivery of
420 the modules.

421 It was made clear to the group of PSTs that what we hoped to gain from the experience of
422 evaluating their experiences, perceptions and opinions was to improve future employment of
423 constructivist pedagogies to enhance PSTs' associated learning experiences. While the topic of

424 study, i.e., to explore the extent to which the constructivist pedagogies employed by teacher
425 educators assisted PSTs in their understanding and construction of knowledge about instructional
426 alignment, may not be sensitive in itself, there is no denying that there was a likely interplay
427 between what the PSTs were prepared to divulge and what they thought we wanted to hear
428 (Graber, 1991). This was complicated by the implications of the researchers also being the
429 teacher educators working with the PSTs on a weekly basis. We are also cognizant that the
430 favoured PST comments may bias those PSTs who were more capable of communicating,
431 through written responses and verbally, their understanding (or not) of the constructive
432 pedagogies being utilized (Kvale & Brinkman, 2006). Hence, we acknowledge perceptions and
433 opinions from some PSTs may be privileged. We by no means attempt to convey privileged truth
434 claims from what the PSTs did share but rather make an attempt to identify and challenge the
435 principles of constructive pedagogies to enhance PSTs' learning experiences.

436

437 **6. Results**

438 The purpose of this study was to explore the extent to which the constructivist pedagogies
439 employed by teacher educators assisted PSTs in their understanding and construction of
440 knowledge about instructional alignment. **The results are subsequently aligned with three**
441 **construct that contribute to such exploration.** These are (1) how the coursework undertaken by
442 PSTs and the constructivist pedagogies employed in teacher education influenced PSTs' learning
443 to teach, (2) the challenges constructive pedagogies posed for PSTs and suggestions from PST
444 on refining and extending constructive pedagogies and (3) how PSTs experienced and viewed
445 instructional alignment in practice, and the extent to which they were able to use their developing
446 skill in designing worthwhile and enduring knowledge that would be viewed as realistic to young
447 people. Pseudonyms are used for each PST and quotes are presented either as they were written
448 or spoken. Focus group data is denoted by FG and quotes shared from PSTs formal responses to

449 the rich task assignment are denoted as ‘script’.

450
451 6.1 Development of PST learning and an association with learning to teach

452 When considering their own achievement as a result of the rich task **and the pedagogies**
453 **we employed to introduce and develop their own understandings of the task, we found** that a
454 number of PSTs understood the alignment process in developing content through a scheme as a
455 result of this approach, but not without challenges. After taking part in **focused readings,**
456 **individual and group reflections, consulting with a critical friend or taking part in probing peer**
457 **and group-discussions one PST noted,**

458 *I had learned more that way [rich task] than if I actually was sitting reading a book, trying*
459 *to memorise, ‘Okay, a goal has to be achievable, clear ...’ (...)* *If you were sitting learning*
460 *definitions (...) ‘What’s an assessment?’, ‘What’s an aim?’ so for me it [rich task] was far*
461 *easier that way because I knew exactly what I was looking for. (Lorna, FG 1)*

462 *It was like a jigsaw (...) the toughest thing for me was getting the instructional alignment to*
463 *gel with all the other pieces, to actually understand that and piece it all together (...) once it*
464 *was done you could see how the pieces were fitting. (Marie, FG 2)*

465
466 *I wouldn’t have fully understood the whole alignment and the whole everything fitting into*
467 *each other if I hadn’t done the rich task. (Therese, FG 1)*

468 **As a result of** being introduced to instructional alignment **through varied types of peer**
469 **interactions, group case analysis and reflective activities, PSTs highlighted how these pedagogies**
470 **provided the foundation for their growth and developing understanding of the concepts (Fosnot,**
471 **1996). One PST** admitted that **initially** he would have approached the task in one way; *‘Pick a*
472 *goal and then try to see ‘Look, how can I achieve that?’ rather than saying ‘Look, what do I want*
473 *these kids to achieve?’ and then work backwards from that’* (Martin, FG 1). Ashlee admitted, *‘I*

474 would have put down the objectives, but I would have left it hanging rather than linking them
475 with (...) teaching strategies' (FG 2)'.
476

476 PSTs frequently indicated that the rich task and associated pedagogies and learning
477 experiences allowed them to develop a template for future planning, acknowledging that the
478 work they had completed provided them with a resource they could use when teaching in
479 schools;

480 *It wasn't just like an exam paper where you look at it, you never see it again, it goes straight*
481 *in the bin (...) It was something that you had that we were going to use (...) it was our best*
482 *weapon going into teaching practice. (Henry, FG 1)*
483

484 *The scheme of work I use now for doing all schemes of work is that one, so I work through*
485 *the process off that. You know, so I'm able to go back and have the headings and have*
486 *everything and fit them all in. (Therese, FG 1)*

487 Thus the rich task strategy and associated constructivist pedagogies to support it was
488 useful in developing a template for instructional alignment.

489 6.2 The challenge of constructivist pedagogies and suggestions on extending constructivist
490 pedagogies

491 In an attempt to bridge the gap between theory and practice we explored the use of
492 pedagogies that caused PSTs to explore their own current knowledge and begin to link new
493 concepts and principles in ways that made sense to them, even though they initially questioned
494 the practice. For example, the use of a scoring rubric learning task that PSTs, as a cohort, were to
495 construct, agree and use to assess their own, and their peers' work, heightened the PSTs'
496 apprehension towards such constructivist pedagogy, expressing fear of the unknown;

497 *It was just different to anything we've ever done before (...) Having to mark your own work,*
498 *it means that you have to be a total expert and know everything about what you were talking*
499 *about and to have a reason for everything. (Miriam, FG 1)*

500
501 *It was so different to anything that I had ever done before. You know, I would never have*
502 *designed what I was going to assess myself on before. (Lorna, FG 1)*

503
504 *We could decide on what we were actually being assessed on and it was a bit weird because*
505 *usually we're being told what we're being assessed on. (Ashlee, FG 2)*

506 **Despite the PSTs apprehension, we attempted to challenge our students, hold them accountable**
507 **for exploring and discovering new knowledge through what we perceived were challenging**
508 **constructivist pedagogies (Brooks et al, 1993). We refrained from coming to the rescue and**
509 **providing answers when they struggled preferring to encourage, prompt and push them beyond**
510 **their normal comfort zone. The result was PSTs beginning to take responsibility for their own**
511 **learning.** PSTs did convey an appreciation for involvement in constructing and agreeing on the
512 scoring rubric as a group, noting an extent of responsibility for their own learning. A number of
513 PSTs noted concern that being too self-critical in the assessment process may result in them
514 receiving a low grade. This was an inaccurate perception as PSTs were graded on the extent to
515 which they had accurately presented a rationale for the self-allocated score for each element of
516 the scheme. We suspect such an inaccurate perception arises through PSTs having limited
517 exposure to constructivist pedagogies that encourage them to be active, social and creative
518 learners.

519 While there was an appreciation that the two modules were closely linked with respect to
520 encouraging instructional alignment, there was a suggestion that combining the two modules
521 may have made it easier for PSTs to develop their understanding of instructional alignment;

522 *Oh yeah, they were doing alignment in Ann's, but it was separate to what we were doing with*
523 *Deborah, so then we weren't realising that the teaching strategies we were doing with*
524 *Deborah is actually included in the alignment (...). Yeah, it would have been better if they*
525 *were combined, because they linked off each other, but we weren't aware that they linking off*
526 *each other. (Miriam, FG 1)*

527 Ashlee stated that while instructional alignment was covered in both modules, it was towards the
528 end of the semester that the elements appeared to become '*glued together*' (FG 2). PSTs
529 highlighted and appreciated the continuous learning process that the modules promoted,
530 continually being encouraged to '*chop and change*' their scheme where appropriate. **PSTs**
531 **reported learning from the various pedagogies we utilised, especially those that caused them to**
532 **think about and reflect on the process of alignment.** This is evident in Martin's comment where
533 he spoke of instructional alignment and the thought process required of them in developing
534 practice, noting;

535 *We has [have] to think about exactly where we go and not just be thinking about a goal and*
536 *then be thinking about assessment and then be thinking about your content but actually have*
537 *to have everything together. (Martin, FG 1)*

538 As the modules progressed and PSTs were continually being reminded of instructional
539 alignment, there was an acknowledgment that once the rubric was complete there was a greater
540 understanding of how it would direct PSTs' pursuit of instructional alignment within the rich
541 task;

542 *I remember at the time thinking it [the rubric] was a good idea for the scheme of work, to*
543 *take things off the rubric and make sure they were in the scheme of work' (Matthew, FG 2)*

544

545 *With the rich task and with the rubric, you actually had to look at each piece and make sure*
546 *that it did align and you could see the progression from one stage to the other and it all*
547 *linked in together and wasn't just in different parts of the scheme. (Martin, FG 1)*

548 Martin expanded on his comment **after focused readings and challenges from his peers**
549 **caused him to think differently and develop new insights on his learning**, admitting that in using
550 the rubric alongside his scheme with peer assessment he noticed that the elements of his scheme
551 *'weren't really linking in and there wasn't alignment'* (FG 1).

552 **While throughout the modules the PSTs appeared to value different pedagogies and**
553 **ultimately recognized that what they learned from one activity might be quite different to the**
554 **insights gained by their peers, they** provided a number of suggestions on how to extend
555 constructivist pedagogies to better meet their needs and development. They suggested we share
556 examples of previously completed rich tasks at the beginning of the course. They wished to
557 maintain the practice of allowing them to prepare one component of an assessment rubric in pairs
558 (as this was helpful) and suggested the use of a jigsaw format (Aronson, 2008) to learn the other
559 components. They requested more extensive opportunities to grade/critique their own and peers'
560 schemes using a scoring rubric as this is required as part of the rich task, providing useful and
561 practical feedback. **Though they received and appreciated feedback, guidance and constructive**
562 **criticism from peers and instructors**, they would have liked **formal feedback and assessment** on
563 the scheme and its design **from the instructors. This learning from, and interacting with, someone**
564 **viewed as an expert is in line with constructivist pedagogy and worth consideration.** The PSTs
565 suggested combining the two modules and more consistency in introducing learning intentions
566 at the start of each class to contextualise the focus of the lecture and how it 'fits' in the program
567 of study for the related modules. The PSTs also felt it would have been helpful to prepare them
568 at the start of the modules for the amount of time learning the instructional alignment process

569 takes to fully understand and be able to achieve, and ultimately to provide sufficient time for
570 PSTs to revisit their schemes before the end of semester.

571

572 6.3 Facilitating an understanding of instructional alignment

573 The rich task asked PSTs to design a scheme of work, develop an aligned scoring rubric,
574 and then assess their own scheme. The assessment of the final piece, i.e., their assessment of
575 their own work, allowed us to see the combined skills and knowledge PSTs had gained from the
576 modules. It appeared that the PSTs gained insight into the design process through experiencing
577 and reflecting on their own practice in pair and group discussions. Evidence of this was the
578 PSTs' ability to provide a rationale for their scoring decisions that reflected the alignment
579 between curriculum, assessment and instruction.

580 Table 5 provides an overview of the scores given to PSTs on how accurate we felt they
581 assessed and scored their schemes of work, paying particular attention to the rationale they
582 provided for the score given, and not our view of the scheme per se.

583 [Insert Table 5 here]

584 7. Scheme of Work

585 There are two particular components of the scheme of work that are pertinent to the focus
586 of our paper. Firstly, the PSTs' ability to engage with the concept and application of instructional
587 alignment (denoted as 'Alignment' in Table 5) allows us to determine the extent to which PSTs
588 were able to clearly articulate how/why they believed all aspects of the scheme of work were
589 instructionally aligned. Secondly, PSTs' analysis of the teaching strategies (denoted as 'Teaching
590 strategies' in Table 5) allows us to examine the extent to which PSTs provided an appropriate set
591 of learning experiences and instructional strategies to progress toward the learning outcomes.
592 Interestingly, both items were scored relatively low by the teacher educators with regards to the
593 rationale PSTs conveyed for the way in which they had addressed each item.

594

595 7.1 Application of instructional alignment

596 PSTs ability to design lessons that align the learning goal with the assessment and then
597 use appropriate instructional strategies and learning experiences to allow the students to be
598 successful was quite variable. Some PSTs gained a deeper understanding of pedagogical
599 practices by questioning and probing one another in an environment that provided freedom to
600 explore while being held accountable for their own developing practices. For example, Ciaran
601 commented that, *'the process of matching goals to assessment and to instructional strategies*
602 *focuses on three questions (Siedentop & Tannehill, 2000). What do I want them to achieve (big*
603 *picture goal)? How will I know they have achieved it (assessment)? How will I get them their in*
604 *the most effective way (teaching strategies)? Group challenges helped me answer this question'*
605 (script 8). It is however worrying that a few PSTs were just developing the notion of
606 instructional alignment, with Declan failing to articulate what the concept means in practice, *'I*
607 *failed to discuss the alignment between the goals, teaching strategies and assessment. I can see*
608 *them linked in the scheme but did not discuss what or how this was achieved'* (script 13). A few
609 PSTs demonstrated alignment well in the scheme and rationale and several were able to
610 articulate understanding of the alignment concept, and demonstrate it in the scheme. Carmel
611 accurately suggested that *'instructional alignment is deciding what you are going to teach and*
612 *then teaching and assessing that'* (script 23), and then continues to do so in her scheme and in
613 her scheme assessment, being specific and clear in discussing her alignment of each aspect of the
614 scheme. A few PSTs were not able to indicate why they scored themselves lower, or what was
615 missing in making the scheme more aligned. One PST failed to describe alignment or determine
616 if it was present in the scheme (script 9). In a couple of cases the PST expected us to 'see' the
617 alignment without the need to explain what it meant or how they view it, such as Sonya who

618 stated, *'As you can see through the scheme all areas were looked at in depth and aligned*
619 *accordingly'* (script 11).

620 When analysing instructional strategies and viewing PSTs' comments, it was interesting
621 to us that most of the PSTs did not link their learning or lack of learning to the pedagogies we
622 employed to aide them. This is a problematic for us in that our analysis of PSTs' choice of
623 instructional strategies indicated a mixed ability among the PSTs to design appropriate strategies
624 and explain how and why they might be effective. Yet, we do not know if it was the content or
625 the learning experiences we provided that were the issue in their ability to select appropriate
626 strategies. There were a few instances where instructional strategies and learning experiences
627 were chosen and described yet did not appear to match or be linked to learning outcomes. This
628 suggests that PSTs may have randomly cut and paste from handouts or picked activities they had
629 enjoyed but had not connected to outcomes of the specific lesson. Not linking instructional
630 strategies to the specific scheme of work is apparent in Casey's script when he listed four
631 strategies (small group work, teaching through questions, student mediated learning, and
632 problem solving) and reproduces the descriptions provided in lectures (script 2). On the other
633 hand, Therese provides detailed and specific rationale for her choice of learning experiences and
634 aligned instructional strategies to meet the outcomes students are striving to achieve (script 3).
635 Interestingly, some PSTs designed assessment tools that were also learning experiences, yet
636 these were not mentioned in the instructional strategies section of the scheme, encouraging us to
637 question whether they understood the concept of an educative assessment that might be one
638 instructional component of a lesson. Other PSTs provided limited discussion of instructional
639 strategies to demonstrate understanding and lacked detail to clarify how strategies would assist in
640 student development of learning outcomes. Some PSTs used appropriate language yet did not
641 explain how such terms were linked to student learning. This is apparent in Martin's comment,
642 *'teacher focused activities made sure that safety and discipline were maintained'* (script 10) as

643 he does not discuss what teacher-focused activities include or how they achieve what he
644 suggests.

645

646 **8. Discussion and Conclusion**

647 The purpose of this study was to explore the extent to which the constructivist
648 pedagogies, associated with the rich task, employed by teacher educators assisted PSTs in their
649 understanding and construction of knowledge about instructional alignment. Through peer
650 interaction in the form of discussion with critical friends, probing and challenging one another's
651 insights and interpretations, group problem solving and sharing of outcomes through various
652 pedagogical strategies such as the jigsaw and world café allowed PSTs to develop or struggle
653 with the construction of their knowledge of instructional alignment. Our practice of criterion
654 referenced instruction (Cohen, 1987) encouraged the tasks that were to be learned to be the same
655 ones that are taught and ultimately measured (Tannehill, 2001), not only in the PETE program
656 but also in providing PSTs with constructivist pedagogies they could transfer to learning to teach
657 as novice teachers.

658

659 While word limits allowed us to unpack only two items from the scheme of work, Table
660 5 conveys that PSTs were competent (exemplary or strong) at setting a big picture goal and
661 identifying learning outcomes for student learning. They demonstrated skill (strong to
662 acceptable) in identifying the area of study to which their scheme best fit, selecting the content to
663 be learned through a concept map, designing appropriate instructional strategies to facilitate
664 learning and developing assessment tools to reinforce and extend that learning. PSTs displayed a
665 mixed range of skills at selecting an appropriate curriculum model to serve as the framework for
666 the scheme of work and student learning. These areas of strength and deficiency serve to guide
667 the teacher educators in their revision of the two modules as they are combined into one module

668 that provides a more sequential and progressive introduction to learning and practicing concepts
669 of instructional alignment.

670 PSTs conveyed initial confusion about the rich task assessment expectations and
671 difficulty in making the connections between the two modules and their content. As the semester
672 progressed, the PSTs moved from feelings of fear and apprehension to being confident as they
673 recognized their own development. This recognition was a result of their experience with the rich
674 task learning process that included both the design and the self and peer-assessment of the
675 instructional alignment scheme development. It was clear that PSTs had perhaps not been
676 previously exposed to such constructivist pedagogies that encouraged them to be responsible for
677 their own assessment criteria and to be directly assessed on what they had opportunities to
678 overtly practice throughout the modules. **We gained insight into PSTs' learning as a result of
679 self-assessment. Similar to Ross and Bruce's (2007) study, these PSTs found that self-
680 assessment served to confirm their learning, and supported their current and developing beliefs
681 and practices while being prompted to examine alternatives to improve teaching and learning.
682 Ross and Bruce (2007) also explore the use of peer interaction as a means to challenge peer
683 perspectives, encourage sharing of ideas and feedback to encourage change, and even pose
684 questions that may contradict and/or support the instructor. This type of challenge may cause the
685 PST to rethink their stance on a topic and build on existing knowledge to develop alternative
686 perspectives.**

687 Ultimately, the PSTs understood and valued the process of instructional alignment while
688 also providing suggestions on how to make the modules more useful in facilitating their learning
689 of the alignment process. Such suggestions encourage us to revisit Carter's (2008) conceptual
690 model of an aligned instructional program, and re-examine the extent to which we can more
691 deliberately convey the integration between the three components of instructional alignment,
692 particularly related to the way in which the curriculum for both modules is constructed.

693 This study is the first step in our development of one aspect of the Graduate Diploma in
694 Physical Education program. We were able to determine how knowledge for teacher education
695 can be generated at a local level to address the unique and situational issues embedded in own
696 settings and be generative for PST learning. We intend to continue the partnership format we
697 have established with the PSTs, and take their advice attempting alternate strategies and formats
698 to more fully capture their needs. This is not dissimilar to the concept of ‘communicative
699 alignment’ (Knewstubb & Bond, 2008) which conveys the relationship between faculty and
700 students’ understandings of the same teaching-learning event. Consistent with Shulman’s (1999)
701 notion that the scholarship of teaching is focused on student learning as much as teaching, we
702 considered the instructional strategies employed in these modules as a means of allowing the
703 PSTs to be productively engaged in their own learning, and learning to teach, thus reinforcing
704 their understanding.

705 This study could be envisaged as the first ‘chain’ in what Cochran-Smith (2005) terms the
706 ‘chain of evidence’ concerned with providing empirical evidence to link constructivist teacher
707 education to student learning. That is, while this study initiates an interest in teacher preparation
708 programs and PSTs’ learning, examining the more immediate effects of teacher education
709 coursework on PSTs’ knowledge, further research is necessary to not only establish how
710 instructional alignment affects PSTs’ learning and their practices in classrooms but also what and
711 how much their students learn from associated practices. There is a continuing concern
712 internationally in teacher education (Feiman-Nemser, 1990) and PETE (O’Sullivan, 2003) with
713 establishing the extent to which the outcomes of teacher learning contribute to student learning.

714 In reporting research specific to the use of constructivist perspectives on teacher learning
715 in physical education, Tsangaridou (2006) concluded that “teacher knowledge is experiential,
716 procedural, situational and particularistic” (p. 511), which suggests the need for innovative,
717 reflective, and thought provoking pedagogies be employed by teacher education to assist

718 teachers in their construction of teacher knowledge and practice. Tsangaridou (2006) suggests
719 that, “there are indications in the literature that greater thought needs to be given on what
720 actually teachers know, how they come to know, and/or what they think they need to know about
721 teaching and learning. More studies to capture the collective understanding and orientations of
722 the nature and content of teacher knowledge are definitely needed in the near future” (p. 511).

723 We have become more aware of the pedagogical tools we employed that were most
724 effective in stimulating, motivating and promoting learning among our PSTs. We recognize that
725 not all the strategies we employed will be effective in all settings yet suspect that they can be
726 adapted and modified to meet the needs of developing teachers internationally in various
727 contexts and cultures. As Avalo (2011) suggests, “the effort to construct models of teacher
728 development is also a way of searching for unifying threads in the midst of diversity” (p. 17).

729

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Table 1: Learning outcomes, content themes and assessments for two modules

	Physical Education Curriculum and Assessment module	Introduction to Teaching in Physical Education module
Learning outcomes	<p>On completion of this module you will;</p> <p>(1) define the meaning of curriculum and list curriculum concepts and issues</p> <p>(2) describe the components and dimensions that define Irish school physical education curriculum</p> <p>(3) identify specific connections between value orientations and the teaching and implementation of physical education curriculum</p> <p>(4) distinguish between the aims and objectives of the primary and post-primary physical education curriculum in Ireland and examine the extent to which each convey an overt and / or hidden curriculum</p> <p>(5) articulate the principles of curriculum models in physical education</p> <p>(6) differentiate between the best use of particular curriculum models in relation to the curriculum focus, the interests and values of the students and the values of the teacher</p> <p>(7) distinguish between formative and summative assessment and identify means of assessment that support each</p> <p>(8) discuss the relationship between assessment, learning goals and learning experiences (instructional alignment), determining what is worth assessing and how this can be done in a meaningful, relevant and effective way</p> <p>(9) appraise the effectiveness of ‘assessment for learning’ in the physical education context</p> <p>(10) construct an argument for or against the development of a solid relationship between the school physical education curriculum, extra-curricula and youth sport and the role of the physical education teacher</p>	<p>On completion of this module you will;</p> <p>(1) articulate the dimensions of effective teaching in physical education</p> <p>(2) distinguish between a select number of instructional strategies for use in teaching physical education</p> <p>(3) describe preventive and remedial class management strategies to ensure a supportive and equitable learning environment.</p> <p>(4) design lesson plans that motivate and engage all students in their classes</p> <p>(5) articulate their beliefs about teaching</p> <p>(6) develop capacities to monitor their own growth as teachers and use that learning to reflect on and improve their teaching practices</p> <p>(7) develop skills to monitor the teaching and learning process and use that learning and their own teaching metaphor and life experiences to enhance their teaching and pupil learning</p> <p>(8) develop capacities to manage the classroom/learning environment and deliver instruction that reflects respect for pupils and care for their learning</p> <p>(9) design lessons and strategies to motivate the pupils in their classes</p> <p>(10) develop a professional web page to communicate their values as teaching professionals and their vision of physical education and the physically educated student</p> <p>(11) develop concern with enhancing pupil learning and their development as persons who support a just and equitable society</p> <p>(12) develop dispositions to reflect on the teaching and learning</p>

		<p>process and use that learning together with their teaching metaphor and life experiences to enhance their teaching and pupil learning</p> <p>(13) develop a commitment to their own professional approach and work in collaboration with peers and experienced teachers to learn as much as they can about teaching and being a teacher who supports positive learning experiences for students.</p>
Weekly content themes	What is curriculum? / Value orientations / Curriculum issues / Assessment / Curriculum models / Instructional alignment / International perspectives on physical education curriculum / Relationship between physical education, extra-curricular sport and youth sport	<p>Research on effective teaching skills and competencies / Creating and maintaining an effective learning environment / Developing skill in delivering instruction using generic teaching strategies / Delivering instruction to a diverse population of learners using selected instructional formats / Observing, assessing and reflecting on teaching performance and student learning / Planning for meaningful and effective learning / Create a your teaching metaphor, core beliefs/philosophy of teaching, and your goals/expectations for a physically educated student</p>
Assessments	<p>(1) Curriculum workshop preparation (20%)</p> <p>(2) Assessment portfolio (40%)</p> <p>(3) Rich task (40%)</p>	<p>(1) Preventive management plan (10%)</p> <p>(2) School ethnography of teaching practice site (teacher case study, student case study, school ethos, community mapping)(30%)</p> <p>(3) Teaching metaphor, core beliefs/philosophy of teaching, and goals/expectations for a physically educated student (20%)</p> <p>(4) Rich task (40%)</p>

Table 2: Scoring Rubric Designed by Graduate Diploma Students to Score Schemes

Name: _____

	5	4	3	2	1	Assessment of your score
Big picture goal	A goal that is developmentally appropriate, reflects something worth achieving, and is realistic, unique, and challenging	A goal that is developmentally appropriate, reflects something worthy achieving, and is realistic	A goal that is somewhat developmentally appropriate, reflects something worth achieving, and is somewhat realistic	A goal that is somewhat appropriate, somewhat worth achieving, and somewhat realistic	A goal that is inappropriate and not worth achieving	
Big picture assessment	Clearly and logically matches the big picture goal	Clearly matches the big picture goal	Matches most elements of the big picture goal	Matches some elements of the big picture goal	No match to the big picture goal	
Area of study	Learning outcomes clearly and logically match the big picture goal and the JCPE area of study	Learning outcomes clearly match the big picture goal and the JCPE area of study	Learning outcomes have some relevance to the big picture goal and the JCPE area of study	Learning outcomes have some relevance to the big picture goal or the JCPE area of study	Learning outcomes have no association to the big picture goal and/or the JCPE area of study	
Curriculum model	Appropriate and detailed rationale stating why / why not a curriculum model will allow you to most effectively deliver the content	Appropriate rationale stating why / why not a curriculum model will allow you to deliver the content	Rationale for why / why not a curriculum model was chosen to deliver the content	Vague rationale for why / why not a curriculum module was selected	No rationale provided	
Task and skill analysis	Relevant chunks (TA) of content are identified to reach Big Picture Goal and are broken into thorough and detailed component parts (SA)	Relevant chunks (TA) of content are identified to reach Big Picture Goal and are broken into component parts (SA)	Most relevant chunks (TA) of content are identified to reach Big Picture Goal and most are broken into component parts (SA)	Some relevant (TA) content identified to reach Big Picture Goal and some broken into component parts (SA)	No selection of chunks (TA) of content are identified	

	5	4	3	2	1	Assessment of your score
Learning outcomes	Clearly defined learning outcomes that match all chunks of content identified in the task analysis	Defined learning outcomes that match all chunks of content identified in the task analysis	Defined most learning outcomes that match most chunks of content identified in the task analysis	Defined some learning outcomes that match some chunks of content identified in the task analysis	Insufficient learning outcomes that do not match chunks of content identified in the task analysis	
Modes of assessment	A well-designed monitoring system that assesses learner performance and measures progress towards all learning outcomes with at least one authentic assessment for each outcome that is based on criteria and linked to a scoring tool where appropriate	A monitoring system that assesses learner performance and measures progress towards all learning outcomes with at least one assessment for each outcome that is linked to a scoring tool where appropriate	A monitoring system that attempts to assess learner performance and measures progress toward some learning outcomes with a few assessments linked to a scoring tool where appropriate	A vague monitoring system that attempts to assess learner performance and measures progress toward some learning outcomes with a few assessments	No assessment of learning performance	
Teaching strategies	Students have clearly identified in annotated format a developmental set of instructional strategies and adaptations that cater to all learners to achieve all learning outcomes	Students have identified in annotated format a developmental set of instructional strategies and adaptations that cater to all learners to achieve all learning outcomes	Students have identified in annotated format a developmental set of instructional strategies and adaptations that cater to most learners to achieve most learning outcomes	.Students have vaguely identified a developmental set of instructional strategies and adaptations that cater to some learners to achieve some learning outcomes	Students have not identified a set of instructional strategies and adaptations	
Instructional alignment	Clear and innovative learning goals that logically align with teaching strategies/adaptations and assessments	Innovative learning goals that align with teaching strategies/adaptations and assessments match	There is unclear alignment between the learning goals, strategies and assessments	There is limited alignment between the learning goals, strategies and assessments	There is no alignment between the learning goals, strategies and assessments	

Table 3: Rich Task Scoring Rubric – Instructor

As noted in the rich task description, your rationale for each element should be **specific and explicit** but not wordy (300 word maximum for each element), **articulate, accurate, and detailed**. Points will be determined according to these criteria.

Aspect of Rubric	Exemplary 5 pts	Strong 4 pts	Acceptable 3 pts	Developing 2 pts	Lacking 1 pt	Comments
Big Picture Goal						
Big Picture Assessment & Scoring Tool						
Area of Study						
Curriculum Model						
Concept Map						
Specific Learning Outcomes						
Learning Experiences / Teaching Strategies						
Instructional Adaptations						
Modes of Assessment & Scoring Tools						
Instructional Alignment						
TOTAL						

Exemplary Outstanding. In-depth knowledge and understanding of principles and concepts related to the topic. Integrates information into a wider context. Excellent analysis and interpretation. A logically structured and clear approach. Answer is original and reflective.

Strong A comprehensive knowledge and understanding of principles and concepts. Well developed analysis and interpretation. Answer may have neglected to deal with one or two minor aspects of the issues involved. A logically structured and clear approach.

Acceptable	A reasonable level of knowledge. Good analysis and interpretation. Some gaps/oversights in either knowledge or in the approach taken. Reasonable analytical and interpretative skills.
Developing	Shows a familiarity with the content. The approach taken to answering the question is rather limited focusing solely on material covered in lecture notes. A basic knowledge of key principles and concepts only. Limited analytical and interpretative skills
Lacking	A poor answer, unsatisfactory in some significant ways. Little evidence of analytical or interpretive skills. Answer disorganized and lacks intellectual depth; little related to material discussed in class or applied in practice.

Table 4. Scores given by faculty on PST assessment of their own schemes of work (n=31)

<i>Items</i>	<i>Exemplary</i> 5	<i>Strong</i> 4	<i>Acceptable</i> 3	<i>Developing</i> 2	<i>Lacking/ Missing</i> 1
Big picture	7 (22%)	13 (42%)	3 (10%)	6 (19%)	2 (6%)
*Big picture assessment (n=15)	10 (67%)	2 (13%)	3 (20%)		
Area of study	5 (16%)	14 (45%)	11 (35%)		1 (3%)
Curriculum model	6 (19%)	12 (39%)	10 (32%)	2 (6%)	1 (3%)
Concept map	2 (6%)	12 (39%)	12 (39%)	5 (16%)	
Specific learning outcomes	3 (10%)	18 (58%)	8 (26%)	1 (3%)	1 (3%)
Teaching strategies	7 (22%)	6 (19%)	12 (39%)	3 (10%)	3 (10%)
Modes of assessment	2 (6%)	12 (39%)	12 (39%)	5 (16%)	
Alignment	4 (13%)	10 (32%)	14 (45%)	2 (6%)	1 (3%)

*Only 2008-09 (n = 15) examined big picture assessment

Table 5 Scores Given by Faculty on PST Assessment of Their Own Schemes of Work (n=31)

Items	Exemplary 5	Strong 4	Acceptable 3	Developing 2	Lacking/ Missing 1
Big picture	7 (22%)	13 (42%)	3 (10%)	6 (19%)	2 (6%)
*Big picture assessment (n=15)	10 (67%)	2 (13%)	3 (20%)		
Area of study	5 (16%)	14 (45%)	11 (35%)		
Curriculum model	6 (19%)	12 (39%)	10 (32%)	2 (6%)	1 (3%)
Concept map	2 (6%)	12 (39%)	12 (39%)	5 (16%)	
Specific learning outcomes	3 (10%)	18 (58%)	8 (26%)	1 (3%)	1 (3%)
Teaching strategies	7 (22%)	6 (19%)	12 (39%)	3 (10%)	3 (10%)
Modes of assessment	2 (6%)	12 (39%)	12 (39%)	5 (16%)	
Alignment	4 (13%)	10 (32%)	14 (45%)	2 (6%)	1 (3%)

*Only 2008-09 (n = 15) examined big picture assessment

Figure 1: Rich task

Component 1: Unit design

- a) Identify a “big picture” goal and a ‘big picture’ assessment for a unit of instruction
- b) Identify the area of study that promotes this goal best and discuss the learning outcomes of this area
- c) Identify the curricular model that is best suited to teaching toward student achievement of this goal
- d) Identify specific learning outcomes you would want pupils to achieve by the conclusion of this unit of study
- e) Describe the teaching strategies and instructional formats (as opposed to teaching style) you might adopt and comment on their appropriateness to the learning outcomes and the content you would be
- f) Present the modes of assessment you would use to assess student learning in this unit of study
- g) Discuss the alignment between your learning goals, teaching strategies, and assessment measures.

Component 2: Assessment tool

- b) During the modules PST will discuss and construct an assessment tool and marking criteria to be used to score the above unit. Appendix # provides an example of the scoring tool that the PST developed to assess their own work.

Component 3: Exam

- a) During autumn examinations PST will use the agreed assessment tool to evaluate and score their own unit design. PST will provide the rationale for each of their scores on all components, thus articulating their understanding of the concepts and appropriate application of them.