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# Asking better questions! A review of the pedagogical strategies used in one senior level award in Scotland

*Malcom Thorburn, Katrina Seatter*

*Abstract:* Previous related research on teaching effectiveness in one senior level award - Higher Still Physical Education (HSPE) in Scotland - revealed a number of extended challenges in adopting the practical experiential teaching and learning approaches advised. However, these studies were restricted by lack of observation of teaching and learning in action and of detailed analysis of the types and timings of questions asked. The present study addressed these limitations. Data were collected through observations of teaching, questionnaire responses on the uses of discussions by pupils and teachers and semi-structured teacher interviews. Findings revealed that there were encouraging signs of a broad range of purposeful question techniques being used in practical sessions. However, there was still a lack of full teacher trust in these approaches, despite high pupil endorsement for their usage. We conclude that perceived subject content and external assessment demands continue to constrain pedagogical strategies in HSPE.

*Key words:* questions, pedagogy, learning, physical education.

## Introduction

In a general study of teaching expertise in senior awards in secondary schools, Ayers, Sawyer and Dinham (2004) found that four main factors: relationships with pupils; the pupils themselves; faculty co-operation and classroom practices influenced teacher effectiveness most. This paper predominantly focuses on the latter of these factors. Specifically, we analyse the question

strategies teachers used and the challenges associated with their usage. These pedagogical matters are important to review in newly introduced examination subjects such as physical education where there is an expectation of high levels of practical experiential learning as well as securing high levels of academic attainment (Thorburn, 2007). Furthermore, while academic reviews in physical education, have often endorsed the merits of constructivist-informed learning approaches they have remained rather undeveloped in terms of how they might be authentically enacted. For example, Kirk and Macdonald's (1998) critique of situational learning reviews the co-constructing importance of pupils' active engagement in the learning process alongside teachers' decision-making role. However, there is limited elaboration provided on how such imperatives could be taken forward by teachers in order to support pupils' learning. Therefore, key questions remain about how teachers can effectively plan their pedagogical strategies for bringing about the intended learning benefits. Furthermore, the research takes place against a wider backdrop of curriculum change in Scottish schools, where there is an expectation that pupils will take on increasing responsibility for the pace and direction of their learning at all stages in their schooling (Scottish Government, 2009). As such, the research represents a forerunner of the broader pedagogical challenges teachers will face in future years through the greater emphasis there will be on holistic learning and improving pupils' curriculum literacies (Scottish Government, 2008). Drew and Mackie (2011) provide a further flavour of the type of change agendas scheduled by defining the potential of active learning, when framed around an integrated mix of behavioural, cognitive and social dimensions of pupil involvement. The authors highlight as well that more active type learning approaches are potentially problematic for teachers as it 'appears to position them in a more sidelined teaching role than they are accustomed to' (Drew & Mackie, 2011, p. 459). These issues matter in physical education as well; for while it is widely recognized that careful pedagogical questions can help develop social skills, high quality discussion and the sharing of ideas (James, Griffin & Dodds, 2009; MacPhail & Halbert, 2010), quite how these qualities can be nurtured has received less attention to date.

In reviewing the particular requirements of teaching new national examination standards Watts and Bentley (1991) used 'strong' and 'weak' definitions of constructivism as a way of describing contrasting teaching approaches. Strong constructivism is underpinned by a deeper understanding of structure and organization, which enables pupils to go beyond the information provided when answering questions. When analyzing the extent to which such teaching approaches existed in the National Curriculum in England and Wales, Watts and Bentley (1991, p. 175) commented that it barely

existed, with the authors finding instead 'something we might call convenient constructivism'. This 'weak' form of constructivism was characterized by notions such as 'starting from where the learner is at' and the teacher acting as a 'facilitator' (Watts & Bentley, 1991, p. 172). As such, the authors were skeptical about the merits of weaker forms of constructivism. Their views reflect earlier theorizing by Brophy and Good (1986), who found that efficient learning was characterized by pupils being able to blend existing knowledge with new concepts when problem solving. Furthermore, effective teachers are usually very active in their teaching with lessons tending to be highly structured. As Ayers et al. (2004, p. 144) note in such environments, 'many questions were of the drill-review type' with more open questions being less common and mostly used to foster higher-level thinking.

Ayers et al. (2004, p. 141) study is of particular interest, as it is one of the few studies to focus on effective teaching in 'high stakes' senior school national examination awards. Nineteen high achieving teachers were observed and interviewed. The authors found that more than half of all lessons observed made extensive use of questions. Almost all whole class questions were convergent closed questions which followed a dialogue pattern of question, answer and explain. As the authors note, closed questions were used as 'a major strategy in building understanding, often step by step and aimed at the whole class' (Ayers et al. 2004, p. 157). This strategy enabled teachers to connect new answers with pupils existing knowledge and was particularly used during the first part of lessons with later parts of the lesson tending to involve more independent learning and the use of more divergent, open questions. Their review indicates that the way teachers frame questions is a complex practice where care is needed if pupils are to take on a meaningful co-construction role. This is particular so with regard to selecting the purposes of questions, reviewing how questions facilitate pupil thinking and choosing the types of activities which encourage questioning. On this basis of the apparent challenges in asking better questions in national examination awards it appears a productive time to investigate two teachers' use of questions in one senior secondary subject examination in one school, in order to better understand pupils' and teachers' perceptions of the merits of different question approaches.

### *Types, timing and delivery of questions*

Pryor and Croussouard (2008) categorised questions as either convergent or divergent in order to distinguish factual recall questions from thoughtful questions. The authors found that if teachers ask thoughtful (divergent) questions, pupils will be better able to reflect on, examine or analyse their performance as

higher-order (more complex divergent) questions can stimulate understanding and encourage pupils to think deeply and creatively and to ask better questions themselves. McNeill, Fry, Wright, Tan and Rossi (2008) concur and advise that how questions are asked is crucial to developing understanding with divergent questions enabling pupils to find their own unique and alternative solutions to learning tasks. However, the prevalence of divergent questions in physical education may well be modest. McNeill et al. (2008) found that just over three-quarters (76.3%) of questions asked by novice teachers in secondary school physical education classes were convergent questions. This approach might be plausible however, if such questions were carefully sequenced: e.g. starting from factual convergent questions and building to divergent questions in order to encourage higher order thinking. Such a strategy would encourage pupils to discuss their ideas with their peers and provide additional thinking time as necessary. Webster (2010, p. 430) in a sport context concurs and argues that 'presenting information in a step-by-step manner could arguably work to assist students in staying focused without compromising attentional resources.'

Good and Brophy (2007) have also tried to distinguish the particular merits of different types of questions. They categorise questions as non-academic, academic factual or academic opinion and thereafter as thoughtful questions, fact questions, and choice questions.

The authors describe thoughtful questions as ones requiring pupils to explore issues at length, relative to fact questions where pupils need to recall facts from memory. Good and Brophy (2007) indicate that learning levels can be enhanced when thoughtful and fact questions are used in sequences in order that key points can be highlighted. The authors' outline how choice questions can be asked conversationally and can be helpful for teachers in finding out what pupils know and understand, and also what is of interest to them to review further. For example, a question such as 'I feel our class has a good balance of classroom and practical sessions' is an academic opinion / choice question (Table 4) relative to 'when we have discussions in practical sessions, I feel this develops my understanding of the course' which is an academic opinion / thoughtful question (Table 4). By contrast questions such as 'I have regular discussions with my teacher on my progress and the areas I need to improve on' is an academic fact question (Table 4). Questions can also be directed to the whole class, individuals or to groups. Whole class questioning throughout lessons allows pupils to reflect on learning intentions (Light, 2002). Similarly, whole class questions during lesson closures, or plenaries, can provide pupils with the opportunity for high quality discussion (Webster, Connolly & Schempp, 2009).

However, despite these claimed advantages, McNeill et al., (2008) found that questions in whole class situations are relatively ineffective at developing pu-

pils' understanding with smaller group questioning being more advantageous. The authors also highlight that questions should be layered during lessons to develop understanding, with all that this entails for how teachers listen, review and remember pupils' previous answers and general responses to questions. Further related research has also explored which pupils are asked questions, with evidence suggesting that questions are often directed to pupils who are in close proximity to the teacher, leaving other pupils excluded from interactions (Black, 1999). This could have particular implications for physical education where classes naturally occupy large spaces and where teachers need to consider carefully the merits of asking questions across relatively long distances when calling classes together and discussing issues.

A teachers experience is also considered an influence on the timing and delivery of questions with novice teachers tending to ask many questions with a short reply time interval. This often fails to allow adequate time for pupils' to reflect on questions (McNeill, Fry, Wright, Tan, Tan, & Schempp, 2004). A further difficulty identified by Black (1999) was that questions were often oversimplified and required very little thinking time before pupils responded. By contrast, Webster (2010, pp.431-432) found that 'expert teachers are more opportunistic and flexible in their teaching than novice teachers' and that this can have a positive dividend in terms of negotiating with pupils and in terms of helping pupils to become more active co-constructors in learning.

Based on this introductory review of the teacher effectiveness demands of utilizing constructive-informed pedagogical approaches in practical experiential learning environments, the purpose of the present study is to review specifically the question strategies two teachers deployed within one senior level award in Scotland. The award context used for the collection of observational and interview data was Higher Still Physical Education (HSPE); a new examination award which was introduced in Scotland in 1999 (Thorburn, 2007). Prior to this examinations at this level and of this type did not exist in physical education. Thus, teachers are at the pedagogical forefront of devising strategies in-action which is both true to the HSPE rationale and effective in action.

## Higher Still Physical Education

HSPE is defined by a rationale for practical experiential learning being the basis upon which pupils can improve the quality of their practical performance and analytical understanding (SQA, 2005). The model of school planning is predominantly a decentralized one with schools designing their own individualized courses through linking school strengths (e.g. in terms of staffing and

facilities) with national arrangements regarding activities, learning experiences and attainment outcomes. Practical workshops are suggested as the best method of teaching and learning as the problem-solving focus in workshops enables pupils to explore and discuss emerging performance related issues in practical settings, such as games hall and playing fields, rather than studying such matters separately in classrooms. Peer work is also promoted as it can encourage pupils 'to work co-operatively with partners or groups and take on a measure of responsibility for their own learning' (SQA, 2005, p.12). However, many teachers have found it difficult to believe in the approaches advised or to enact them in the way intended. For example, MacPhail (2007, p. 52) found, when summarizing teachers (n=151) views, that 'no teacher voiced support for the flexibility encouraged' in the Arrangements document. All teachers wanted greater prescription about what was required in terms of examination content knowledge rather than being asked to make integrated connections between performance experiences and broadly headed areas of analysis. Furthermore, fewer than half (46%) of teachers considered that sufficient teaching and learning resources were available. MacPhail (2007) also found that only a third of respondents (32%) considered that the pedagogical approaches recommended were realistic with nearly 6 out of 10 teachers (59%) citing lack of staff development as the most significant factor influencing their intention to delay the introduction of higher level awards.

Thorburn and Collins (2003) found that only a few teachers (on the basis of interview evidence and scrutiny of national assessment results) had a high level of expertise in the experiential methodologies advised. With these teachers, feedback was effectively built into teaching and learning and pupils were highly motivated and engaged with learning tasks. Pupils were able to complete written assessment answers in the divergent open manner expected, and were able to make informed and personalized connections between performance and the influences that shaped its development. Overall, Thorburn and Collins (2006a) report that teaching HSPE is a testing remit with only certain teachers having the pedagogical refinement to teach through practical workshops and achieve high levels of attainment. This is unfortunate, for as Thorburn and Gray (2010, p. 60-61) note that merging content knowledge with experiential learning approaches would appear to have the capacity to form the 'basis for the development of related discussions, with all the improvements this might yield for the later construction of individually different answers that are true and authentic to pupils' lived experiences.'

However, the extent of the pedagogical problems posed for teachers led many to use classroom-based lessons to support learning. Often this was used following practical lessons rather than as a primer for setting the con-

text for later practical learning. In some cases, teachers became heavily reliant on classroom-based learning. For example, Thorburn and Collins report one teacher stating that:

...there is not a great lot of depth of detail to what they write until after all the practical is over and you spend two months going over the questions, (in a classroom) then they get it. That is when they learn it. Therefore, it is very difficult for them and if you ask them, they are very confused. (2003, p. 199)

On the basis of the frequency of classroom-based learning and teachers continuing unease with meeting national assessment standards, further research studies investigated the benefits of oral assessment in helping pupils produce complex and divergent answers. It was found that carefully planned discussions enabled pupils to comment in greater detail on their performance strengths and weaknesses and analytical understanding (Thorburn and Collins, 2006b).

## Methodology

### *Participants and setting*

In order to address the pedagogical challenges identified, a mixed methods approach, using the interpretive paradigm was implemented. Qualitative and descriptive data were collected. This approach was adopted in order to increase the reliability and validity of results in terms of trustworthiness, rigour, elimination of bias and truthfulness (Silverman, 2006). Triangulation of data was completed by using a combination of observations, interviews and document analysis. The study took place in a city secondary school in Scotland with two separate HSPE classes in March 2011. The school was chosen as its profile of attainment in national awards was consistent with national mean figures. One class had eight pupils (five boys/ three girls) and the other class had 12 pupils (ten boys/ two girls). James (pseudonym) (42) is the Head of Department and has taught HSPE for 12 years. Steven (pseudonym) (31) has taught HSPE for six years. All twenty pupils were in their final two years of secondary schooling, were 16 or 17 years old and nearing the end of their one-year HSPE course which comprised two x 110 and one x 50 minute lessons per week. Prolonged engagement while on teaching placement enabled the second author to build constructive and comfortable relations with the teachers and pupils involved in the study. All parent/guardians completed permission forms associated with in the research. Consent was also granted from the schools' Senior Management



Team. Teachers and pupils were informed about the aims of the study, as well as their individual rights, in order to ensure that human participants' protection procedures were duly recognized.

### *Observations*

Lesson observations were filmed during four of the longer (110 minute) classes with each class being observed twice. Filming enabled observation schedules to be completed which focussed on interactions between teacher and pupils. Three practical lessons and one classroom lesson were observed. The second author devised a specific observation schedule which was based on Good and Brophy's (2007) questioning techniques in order to outline the timing and types of questions which were asked and the responses which were made (Table 1 & 2). Observations from all four lessons are provided (Table 3). The layout utilized for recording observations (Table 3) was designed to enable dependable and repeated use such was the straightforwardness of its format. As such, the observation recording instrument would be able to be reliably used by other researchers. Good and Brophy's (2007) theorizing on question types was utilized for observing teaching and learning interactions as their research recognises that a mixed methods approach works best when trying to make learning individualised, as well as purposeful in a more general whole class context.

### *Questionnaires*

To determine perceptions of questioning approaches, pupils' and teachers' were asked to complete a questionnaire designed by the second author. It comprised eighteen statements for pupils and nineteen for teachers. Responses were recorded on a 5-point Likert scale, ranging from 1 (Strongly disagree) to 5 (Strongly agree). Pupils completed the questionnaire after the lesson observation period, during 'tutor time' (Table 4). This enabled them to answer in private. Teachers completed their questionnaires at the end of the four lessons observed. The results from the questionnaires were collated and the mean and standard deviation calculated (Table 5). These values allowed the researchers to identify the most and least agreed - with statements, and the statements with the highest variance. The questionnaires were completed anonymously and were answered privately, ensuring that pupil responses were not affected by their peers. Questionnaire items were loaded together in a random order. The intention with all questions was that they were as non-threatening as possible, as this provided the support required for pupils and teachers to provide personalised responses (Hale and Graham, 2012). The questionnaires were designed to measure pupils

and teachers strength of view on key aspects of learning and teaching; in particular, pupils views on their degree of activeness as a learner e.g., as evident in statements such as ‘ I find it helpful to have time to discuss ideas with a partner, so we can share others ideas’ (Table 4). For teachers, the questionnaires were intended to record their views on strategies they used to engage pupils with various learning challenges e.g., as evident in statements like ‘ I try to leave enough time for pupils to think about the question before I ask for a response’ (Table 5).

### *Interviews*

Semi-structured interviews by the second author aimed to gain a general insight into teachers’ thoughts and beliefs about teaching HSPE and their specific thoughts on various issues associated with discussion-based practical workshops. The teachers were given the questions before hand to allow them to think about their responses. Interviews were based around six lead questions from which teachers could further outline their thoughts and from which follow-up prompts could act as the source for extended elaboration. The teachers had the opportunity to check completed transcriptions of the interviews for accuracy and to comment later on interpretations drawn from the interviews. Interviews were recorded with each teacher’s permission and lasted approximately 45 minutes. In completing a detailed analysis of the interviews, transcripts were carefully read in order to familiarize ourselves with the data and to ensure accuracy of meaning (Silverman, 2006). Thereafter, multiple readings enabled key issues surrounding the different questioning approaches teachers used to be referenced alongside the relevant theoretical literature on asking questions. Tabulations of the frequency with which key words (e.g. confidence, time, assessment) and terms (e.g. discussing ideas, working together, on task) were repeated were recorded. This was designed to ensure bias was avoided and to confirm the accuracy of the impressions gained from the data collected (Byrne, 2004). As analysis continued illustrative quotes and comments were identified.

In summary, through using three different methodologies (observations, questionnaires and interviews) to review the same research questions on teachers pedagogical practices, different perspectives could be incorporated into the review of findings in ways which increased validity and reliability and lessened the chance of unwarranted conclusions being drawn. Furthermore, this approach to data triangulation was also aided by the second author’s opportunity to develop a good rapport with pupils, to collect observation data unobtrusively and by being a regular presence in the school (Hastie & Hay, 2012).

## Results and Discussion

### *Types of questions*

Few questions were asked during lesson introductions (6.8%) and just under a fifth of questions were asked during lesson closures (18.2%). Three quarters (75%) of questions were asked during the main part of lessons with a variety of different types of question being asked (Table 1). There were differences between the teachers in terms of frequency of questions asked. James asked almost twice as many questions as Steven (64.8% > 35.2%). Allowing ten minutes for lesson introductions and summaries (Table 3), Steven asked on average a question for every six minutes of teaching. James asked more questions (i.e. one for every three minutes of teaching) with a similar frequency of questions asked in both practical and class settings (Table 3). The differences in the frequency of questions asked by pupils were more acute with nine-tenths (90%) of questions being asked during the single classroom session observed (Table 3).

Academic fact questions were used most frequently and made up nearly four-fifths of questions asked (Table 2). However, in one practical lesson, academic opinion questions such as ‘why would you want to do a pre-season test’ were asked most often and made up over half of questions asked (55.6%) (Table 3). James’ questions covered all categories, while Steven only asked questions in half of the six categories outlined earlier. Overall, thoughtful or divergent questions made up just over half of questions (52.3%), and were the most common questions asked. In the classroom based lesson however, factual questions were most frequent, making up three-fifths of questions asked (60.0%). Across all lessons, there were a very low number of non-academic questions (1.1%) and choice questions (8.1%). Pupils offered their responses, most frequently in response to James’ teaching (Table 4). Overall, pupils only occasionally evaluated peers’ responses in the classroom, and never at all when working with either teacher in practical learning environments.

Table 1

### *Lesson observations -timing of questions*

Lesson number & Type	No. of Questions Beginning (%)	No. of Questions During (%)	No. of Questions Lesson Closure (%)
1 Practical	4 (26.7%)	6 (40%)	5 (33.3%)
2 Practical	1 (6.2%)	7 (43.8%)	8 (50%)
3 Practical	1 (3.7%)	23 (85.2%)	3 (11.1%)
4 Classroom	0	30 (100%)	0
Total	6 (6.8%)	66 (75%)	16 (18.2%)

Table 2

*Lesson observations - types of questions and types of response*

## Teacher and Pupil Questions

Lesson number & type	Teacher	No. of Teacher Questions (%)	No. of Pupil Questions (%)
1 Practical	Steven	15 (17%)	0
2 Practical	Steven	16 (18.2%)	1 (9.1%)
3 Practical	James	27 (30.7%)	0
4 Classroom	James	30 (34.1%)	10 (90.9%)
Totals	N/A	88	11

## Types of Questions

Lesson type & number	Teacher	Non Academic, Procedural Question (%)	Academic Fact Question (%)	Academic Opinion Question (%)	Convergent Fact Question (%)	Divergent, Thoughtful Question (%)	Choice Question (%)
Practical	Steven	0	15 (100%)	0	7 (46.6%)	6 (40%)	0
Practical	Steven	0	16 (100%)	0	2 (12.5%)	14 (87.5%)	0
Practical	James	1 (3.7%)	11 (40.7%)	15 (55.6%)	5 (18.5%)	15 (55.6%)	7 (25.9%)
C/room	James	0	28 (93.3%)	2 (6.7%)	18 (60%)	11 (36.7%)	1 (3.3%)
Totals	N/A	1 (1.1%)	70 (79.5%)	17 (19.3%)	32 (36.4%)	46 (52.3%)	8 (9.1%)

## Types of Response

Lesson number & type	Teacher	Teacher calls on pupil to respond (%)	Pupils offer a response (%)	Pupil's evaluate others response (%)
1 Practical	Steven	5 (33.3%)	10 (66.6%)	0
2 Practical	Steven	1 (6.3%)	15 (93.7%)	0
3 Practical	James	6 (22.2%)	21 (77.8%)	0
4 Classroom	James	4 (13.3%)	26 (86.7%)	4 (13.3%)
Totals	N/A	16 (18.2%)	72 (81.8%)	4 (4.5%)

Table 3  
Lesson observation schedules

**Lesson 1:** Testing Week. First week of Preparation of the Body – Multi Stage fitness test (Steven)

Time	Questions Asked in Time period. Discussion content	Type of question and response	Selection of respondent / Pause / Other notes
08:50-09:00	Introduction to Prep of the body Why would you want to do a pre-season test? Can you all remember your scores from S1-S4? What will be important to remember when you are doing your test, will you all be the same? Why am I taking note of all of your dates of births?	AFQ, FR, POR AFQ, CR, COR AFQ, TR, POR AFQ, TR,	Volunteer offers suggestion, another adds to this All ponder their scores, a few offer their past scores Volunteer – try your hardest, we are all different. Pause after question, volunteer suggests different ages due to S5-S6
09:00-09:10	Task. Individual Warm Up John, Detail the three stages of the warm up? Take your heart rate, why are we doing this? What should our HR be at for our warm up? What do you need to do to the intensity of your warm up, increase or decrease?	AFQ, FR, COR AFQ, FR, POR AFQ, FR, POR AFQ, CR, COR	Volunteer asked for response Pause then a volunteer suggested warm up zone for BP Calls on three different volunteers, then asks them whether they need to increase or decrease
09:10-09:45	Test Group 1 & 2		
09:50-09:55	Cool Down and stretch off Why is it important to cool down? Why will the two groups differ in their cool down?	AFQ, FR, COR AFQ, TR, POR	Calls on a volunteer One person offers a suggestions

09:55-10:10	<p>Discussion</p> <p>What's consistent / reliable about our test?</p> <p>Can you set yourselves up in order of results - Where does the class average lie?</p> <p>What is the major difference in national average?</p> <p>What is strange about these figures for national averages in specific sports? Why is this?</p>	<p>AFQ, TR, POR</p> <p>AFQ, FR, POR</p> <p>AFQ, FR, COR</p> <p>AFQ, FR, POR</p> <p>AFQ, TR, POR</p>	<p>Pause after question – volunteer suggests reason</p> <p>On volunteer offers suggestion</p> <p>One observer called for suggestions</p> <p>Same observer continues explanation</p> <p>Same observer continues explanation</p>
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No. of Teacher Qs	No. of Pupil Qs	Non Academic Question	Academic Fact Question (AFQ)	Academic Opinion Question	Factual Response (FR)	Thoughtful Response (TR)	Choice Response (CR)	Calls on respondent (COR)	Pupil offers a response	Pupils evaluate others response	No. of pupils contributed
15	0	0	15	0	8	5	2	5	10	0	8/8

**Lesson 2: Background to Lesson - Second Week of Preparation of the Body – Match Observation schedule (Steven)**

Time	Questions Asked in Time period. Discussion content	Type of question and response	Selection of respondent / Pause / Other notes
08:50-09:00	<p>Discussion of LI – Task</p> <p>Why might we want to use this match analysis schedule? Teacher notes that this will be discussed again at end</p> <p>Players divided into 2 teams, two players picked to play for whole lesson and be analysed</p>	<p>AFQ, TDQ, POR</p>	<p>Volunteer suggests to find out strengths and weaknesses of performance -</p>
09:00-09:10	<p>Game play – match observation</p> <p>Observer – How do we know when to tick or cross?</p> <p>Teacher – what do you think?</p>	<p>NPQ</p> <p>AFQ, TDQ, COR</p>	<p>Observer – my own opinion, whether its been a quality performance or not?</p>

	Why is it important to take HR?	AFQ, FCQ, POR	Volunteer offers answer, another volunteer adds onto it
09:10-09:12	Why are we taking breathing intensity?	AFQ, FCQ, POR	Different volunteer offers answer, another volunteer adds
	What might affect our results about breathing intensity?	ACF, TDQ, POR	First volunteer answers again, own opinions of easy/hard scale
09:12-09:25	Game play – Match observation		
09:25-09:28	What's happening to our players? What's happening to their movements, jogging, standing skill? What's happening to their skills?	AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR	A different volunteer answers question Same pupil answers – question directed at him
09:28-10:00	Game play – match observation	AFQ, TDQ, POR	Same pupil answers - conversation
	Why did we choose these players to observe? What similarities do they have? What differences do they have? What do you notice from the observation schedule? What was consistent about our comparisons? How reliable is our data? Are there any problems with our data? So, why have we done this match analysis and why we do this again?	AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR	Player answers Both players answer The observer – differences in fitness levels Different pupil responds to eval question Longer pause time needed for offer response, pupil volunteers suggestion, another adds to it The same pupil carries on response The same pupil carries on response

No. of Teacher Questions	No. of Pupil's Question	Non Academic Question	Academic Fact Question (AFQ)	Academic Opinion Question	Factual or Convergent Question (FCQ)	Thoughtful or Divergent Question (TDQ)	Choice Question	Calls on respondent (COR)	Pupil offers a Response (POR)	Pupils evaluate others response	No. of pupils contributed
16	1	0	16	0	2	14	0	1	15	0	8/8

**Lesson 3:** Background to Lesson - Class is developing understanding of mental fitness through practical setting, basketball in games hall (James)

Time	Questions Asked in Time period. Discussion content	Type of Question and Response	Selection of respondent / Pause / Other notes
08:50-09:00	Task - Free throw - Shooting routine, think about your routine and how you can be consistent. Is everyone clear of the task	NAQ, COR	Pauses to look for agreement. All nod agreement, say yes
09:15-09:18	Right lets observe how many bounces is in your pre-performance routine? How many bounces? After watching 5 attempts with different no. of bounces - Is this consistent? Consistently good / bad?	AFQ, FCQ, COR AFQ, TDQ, COR, AFQ, TDQ, COR,	Calls on volunteer - allows performer to watch own performance and gives him time to evaluate own routine Calls on volunteer before asks question. Asks group, a different volunteer offers suggestions that needs to do same routine before shot.
09:18-09:22	Do you have a pre-performance routine for golf? Can you show us this? Right, can you go through that again and this time can you explain why you are doing each stage. What do you focus on or visualise when you are looking up the fairway?	AFQ, TDQ, COR AOQ, TDQ, POR  AFQ, FCQ, POR	Calls on one volunteer and then asks question. Asks volunteer to stand up and show his routine. Pauses for wait time, pupil explains his routine for golf. Same volunteer answers, two other volunteers make comments on his routine.
09:22-09:25	Teacher. Let's watch your pre-performance routine on the video? Do you go through a routine? How many bounces? Is he consistently good? What is he doing well? Did you change your routine? Why did you change it?	AFQ, CQ, COR AOQ, FCQ, POR AFQ, CQ, POR  AOQ, TDQ, POR	Calls on volunteer before asking question. Although conversation is directed to volunteer, others contribute their ideas. Another volunteer suggests his routine changes slightly so he isn't consist but towards there is more baskets and more consistency Teacher notes that he changed routine to give more time to settle.



09:25-09:30	TASK. Teacher asks pupils to build pressure onto shot by partner making noise, building to standing right next and shouting	AOQ, TDQ, POR	Teacher pauses and a volunteer suggest that quality decreased and that fewer baskets were scored. A different volunteer suggests that you could visualise the shot before you shoot and focus on own performance. The same volunteer suggests other influences.								
09:30-09:35	What happened when your partner increased the pressure? How did you close them off? How might this be related to a game situation?	AOQ, TDQ, POR AOQ, TDQ, POR AOQ, TDQ, POR									
09:35-09:40	Task - class picks teams from captains. How does it feel to be picked last? What does this do to your confidence?	AOQ, TDQ, POR AOQ, TDQ, POR	Responds by joking - "they're losing out on a good player, doesn't bother me". Class acknowledge joke. Pupil may not want to reveal feelings.								
09:40-10:05	Team talks - then another group discussion. How are you keeping focussed? Are visualising the space? Are you visualising what you are going to do before you do it? How can this benefit your game? Game Play	AOQ, TDQ, POR AOQ, CQ, POR AOQ, CQ, POR	Volunteer - focussing & shut out distractions Volunteer - you can only do that when you are focussed and good / know your next steps								
10:05-10:10	Plenary: Why did we put the condition on the game? Did you deal with the pressure from the other team? Can you think of a time you've had to deal with pressure? Write this up for next week - mental fitness	AOQ, TDQ, POR AFQ, FCQ, POR AOQ, TDQ, POR AOQ, TDQ, POR	Another volunteer - can focus on whole game not just one drive at a time Pupils volunteer answers.								
No. of Teacher Questions	No. of Pupil Questions	Non Academic Question (NAQ)	Academic Question (AFQ)	Academic Opinion Question (AOQ)	Factual or Convergent Question (FCQ)	Thoughtful or Divergent Question (TDQ)	Choice Question (CQ)	Calls on respondent (COR)	Pupil offers a Re-sponse (POR)	Pupils evaluate others response	No. of pupils contributed
23	0	1	8	14	4	15	4	6	17	0	12/12

**Lesson 4:** Background to lesson - Classroom based lesson. Class were going over Preparation of the Body home-work questions. (James)

Time	Questions Asked in Time period	Type of question and response	Selection of respondent / Pause / Notes
08:50-09:00	Can you think of an activity and a role and name some fitness requirements? Can you explain why this fitness requirement is needed? What about some of the differences in formations? What about some of the strengths and weaknesses of these formations? What would this allow your team to do?	AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR AFQ, TDQ, POR	Pupil respond with his answer, speaks about football, different formations, roles, midfielder selected, then he is involved in main conversation, however four other pupils assist with their own ideas
09:00-09:05	Why is speed endurance needed? Why is strength required?	AFQ, FCQ, COR	Conversation continues with same pupil and others
09:05-09:10	What happens if you don't have speed endurance? What about change of pace and penetration speed? How does this effect your decision making time?	AFQ, FCQ, COR AFQ, FCQ, COR AFQ, TDQ, COR	Respondents from different pupils in class
09:10-09:15	Detail your homework answer and explain the principles of training. What are some of the key words we need to include? Can you detail some of the strengths of this answer? How can it be improved?	AFQ, FCQ, POR AFQ, FCQ, POR AFQ, TDQ, POR AFQ, TDQ, POR	Volunteer called upon, who asks another volunteer to cross mark. Cross marker gives some feedback on answer. Cross marker identifies words specific and overload that need to be included
09:15-09:20	Explain a fitness test, what tests you carried out? Has Ben explained - how / why this fitness test would be used? Vo2 max discussion - What happens to organs with training? What happens to o2 transport? How does your fitness improve? What happens if you stop training?	AFQ, FCQ, POR AOQ, TDQ, POR AFQ, FCQ, POR AFQ, FCQ, POR AFQ, FCQ, POR	Volunteer called upon, who called upon cross marker and another cross marker Cross marker identified test procedure explained well but not in enough detail and what it tested.

09:20-09:25	Teacher tells anecdote of personal experience to depict reversibility, why did my heart's health change?	AFQ, FCQ, POR	Two respondents volunteer their answer without being called on							
09:25-09:30	Explain the advantages of conditioned games are beneficial for training. What would you do to improve this answer? Are there any other advantages of this training?	AFQ, FCQ, POR AOQ, TDQ, POR AFQ, FCQ, POR	Volunteer called upon, who called upon cross marker and another cross marker. Cross marker identified more detail and more specific details.							
10:10	Class working in pairs/individually to complete more task questions.	NPQ x 10								
No. of Teacher questions	No. of Pupil questions (NPQ)	Non Academic Question	Academic Fact Question (AFQ)	Academic Opinion Question (AOQ)	Factual or Convergent Question (FCQ)	Thoughtful or Divergent Question (TDQ)	Choice Question	Calls on respondent (COR)	Pupil offers response (POR)	No. of pupils contributed
22	10	0	19	3	11	11	0	4	18	12/12

Table 4  
*Results of pupil questionnaires*

Q.	Statement	Mean	SD ±
1	I enjoy Higher PE, it is one of my favourite subjects	4.3	0.74
2	I feel our class has a good balance of classroom and practical lessons (e.g. in the games hall)	3.8	0.93
3	When we have discussions in practical sessions, I feel this develops my understanding of the course	4.3	0.67
4	I feel I can only understand the theoretical parts of our work when we sit down and discuss it in the classroom	2.8	0.98
5	I feel I contribute to class discussions regularly	4.0	0.39
6	I feel comfortable discussing ideas in front of my classmates	4.3	0.47
7	I feel comfortable discussing my ideas in front of my teacher	4.4	0.50
8	I feel I can ask questions at any point within lessons	4.4	0.50
9	I feel confident answering questions that only have one correct answer	4.0	0.68
10	I feel confident responding to questions that have more than one correct answer and require detailed explanation	3.4	0.99
11	It is always the same people within my class that contribute to class discussions	3.2	0.91
12	I have regular discussions with my teacher on my progress and the areas I need to improve on	3.8	1.03
13	I think our class discussions are more in depth now in comparison to the first term	4.0	0.85
14	If I am unsure of an answer to a question, I try my best to offer a suggestion to my teacher	4.0	0.64
15	I find it helpful to have time to discuss ideas with a partner, so we can share others ideas	4.0	0.56
16	The discussions during our lessons help develops my understanding of the course	4.4	0.50
17	I can understand the analysis knowledge content once I have worked through it practically	4.3	0.61
18	I find it easy to answer a question that requires me to come up with my own opinion	4.1	0.85

Table 5  
*Results of teacher questionnaires*

Q.	Statement	Mean	SD ±
1	The pupils engage in and appear to enjoy lessons	4.0	0.0
2	Discussions in practical sessions are essential for building pupils' theoretical knowledge	5.0	0.0
3	I encourage all pupils to contribute to class discussions	4.3	0.5
4	I find classroom based lessons more productive for teaching theory, compared to practical based lessons	4.0	0.0
5	I believe all of the pupils are comfortable discussing their ideas in front of their peers	3.6	0.5
6	I believe the pupils are comfortable to ask any questions throughout the lesson	3.6	0.5
7	I tend to ask more questions that have only one solution in to a question with many possible solutions	2.0	0.0
8	The pupils appear comfortable attempting to answer questions with many possible solutions (open questions)	4.0	0.0
9	I try to ask questions that require pupils to think about their own opinions and provide an explanation on this basis	4.3	0.5
10	I give the pupils the opportunity to work through theoretical aspects of the course in practical sessions	4.0	0.0
11	I feel our class has an appropriate balance of classroom and practical work	4.0	0.0
12	I have regular discussions with all the pupils on their progress and the areas they need to improve on	4.3	0.5
13	Class discussions have more pupil input now, in comparison to the first term	5.0	0.0
14	Most of the pupils are willing to attempt answering a question, even if they aren't sure they are correct	4.3	0.5
15	I try to leave enough time for pupils to think about the question before I ask for a response	4.3	0.5
16	I believe all of the pupils are comfortable discussing their ideas in front of me	4.0	1.0
17	I encourage the pupils to discuss their ideas with each other before I ask for a response	4.0	0.0
18	Classroom discussions can give me feedback about pupils' level of understanding	4.7	0.5
19	Pupils tend to show a greater understanding of a task by working practically and discussing it afterwards	4.3	0.5

Observations identified that just over a quarter (25.9%) of questions asked during the three practical lessons were convergent in nature and required the recalling of facts from memory.

However, during the single classroom lesson observed, convergent questions made up three-fifths (60%) of questions. McNeill et al. (2004) considers that the frequent use of convergent questioning could be due to the role of subject matter associated with questions. In HSPE, for pupils to complete the outcomes in the national arrangements they require to describe, analyse, monitor and evaluate. Thorburn (2010), in reviewing the analytical competences needed, separated the more process based outcomes (describe, monitor and evaluate) from the more subject based competence (analysis) about which a depth of understanding of specific key content knowledge, is required (SQA, 2005). Evidence continues to suggest that pupils have much more difficulty in making content knowledge rather than process knowledge gains (SQA, 2011). However, previous related research has also shown that pupils' preferred practical learning, followed by homework to classroom based learning and no homework (Thorburn & Collins, 2006a). Pupils in this study concurred with these findings. This raises questions on why teachers found classroom sessions beneficial and were prepared to offset possible reductions in pupils' interest and motivation in order to teach in this setting. James highlighted that 'there is a need for it to be based in classrooms a little bit more, in order to take that experience further', with emphasis placed on developing the links between subject knowledge and practical experiences. Steven considered that the class sessions were useful as a way of supporting the development of writing skills as pupils 'build from one essay to the next, until we have an actual model answer'.

Divergent, thoughtful questions did account however, for just over half (52.3%) of questions asked in the practical sessions, where in two of the three lessons observed, such questions were used three times more often than convergent questions. The majority of pupils were confident in responding to divergent questions in practical settings and considered their use to be helpful in developing the process knowledge skills required. Furthermore, the less experienced teacher (Steven) used these types of questions most often (63.7% > 55.6%). As Pryor and Coussouard (2008) and McNeill et al. (2008) note, thoughtful higher-order questions are better for analyzing performance and encouraging pupils to think deeply, and to ask better questions themselves. This is exactly the type of subject based competence which the vast majority of pupils require in HSPE (Thorburn, 2010).

Despite these encouraging signs, there is still some unease on whether there was adequate sequencing of questions in the ways in which factual convergent questions articulated with divergent questions in developing greater higher order thinking. McNeill et al., (2008) advise that such scaffolding type approaches are crucial for developing understanding, especially when generating individualized responses to generic questions is required, as in HSPE. In this respect, having classroom sessions after practical sessions (as was the case with the teachers in this research) seems to run contrary to the ways in which convergent questions on analytical understanding might best cohere with later divergent questions on the process knowledge associated with improving performance (Thorburn, 2010). Furthermore, as neither teacher is a novice teacher, the use of convergent questions in the classroom might not be easily explained by inexperience.

Both teachers did however encourage pupils to work together on their analysis of performance reviews. Research highlights the benefits of utilising peer discussions when employing divergent questioning (James et al., 2009). Most pupils were comfortable discussing ideas in front of peers and found it beneficial to work with others, with over four-fifths of responses (81.8%) being offered before teachers requested one. This suggests that pupils were able to respond in their own time in order to try and provide a suitably detailed response. Steven described the process as one where ‘once they have come up with an idea...sharing that with their partners and getting an idea between them, then coming into a group to discuss their thoughts.’ During the classroom based lesson, pupils were given opportunities to evaluate and cross mark others responses. James outlined this strategy:

‘... we are not the teacher all of the time, it’s coming from themselves. They can cross mark each other, giving them the opportunity to explain why they think something’s important...so we encourage them to keep discussing, keep questioning and keep getting a deeper knowledge’.

Both teachers highlighted the importance of giving pupils ownership of their learning journey and of helping teach each other, and of learning episodes they have devised to encourage pupils to improve their language fluency (e.g. through debating the merits of tactical principles involved in games). In such ways, as James described it ‘you link to what they know and try to develop that and get them to question themselves and take it further’. Steven described active learning in terms of how:

‘we will tell them what we will be working on, we will do the practical and it links to theory and setting up targets within that, allowing them to work through their own ideas and develop their own ideas and bring it back.’

Such intentions reflect constructivist thinking on how pupils can use their existing knowledge to enhance and deepen their own understanding (Patton & Griffin, 2008). However, the extent to which pupils pre-existing content knowledge is sufficient in terms of depth and complexity to make the progression achieving HSPE remains a concern.

### *Timing and delivery of questions*

Questionnaires aimed to discover pupils’ and teachers’ perceptions of the use of questions in lessons. Except for question 4, analysis reveals that most pupils agreed with the statements, especially for question 3 which asked about the potential of discussion for increasing levels of understanding in practical sessions (Table 4). By contrast, improving understanding in the classroom was considered ineffective. Results also indicated that pupils had a strong feeling of confidence and comfort with the course. This was apart from question 12 where some pupils indicated that the discussions they had with their teacher on progress and the areas to improve on were insufficiently detailed. Standard deviation figures were highest for this question. Teachers agreed with the questionnaire statements, except for question 7 on whether they tended to ask more questions that had only one solution, in comparison to questions with many possible solutions (Table 5). Both teachers strongly agreed with question 2 on the merits of having discussions in practical sessions in order to improve pupils’ analytical understanding, and with question 13 on how frequency of discussions increased as the course progressed. The most varied response focussed on pupils’ responses to being comfortable in discussing their ideas in front of teachers.

As noted earlier, three quarters of questions were asked during lessons with questionnaire evidence confirming that pupils’ participation in class discussions was encouraged. Such evidence contradicts Black’s (1999) contention that questions tend to be mostly directed to a select few pupils in a class. This was perhaps due to the small class sizes (eight and twelve) which enabled teachers to monitor pupils’ contributions closely. Furthermore, both teachers relished the opportunities to work with motivated and interested pupils in such settings. As such, there was little sense of feeling side-lined by the new active learning approaches advised (Drew & Mackie,



2011). Indeed, both teachers commented on how they were trying to further refine their teaching through developing pupils 'conferences' where they could increasingly discuss ideas among each other in preference to answering closed questions in whole class settings. Such intentions mirror McNeill et al.'s (2008) suggestions, that whole class questions can be relatively ineffective at developing pupils' understanding, with smaller group question and review approaches being more advantageous.

Nevertheless, as noted earlier, fewer questions were asked by teachers during lesson introductions and when reflecting on their learning experiences during lesson plenaries. This appears something of a missed opportunity as Light (2002) and Webster et al., (2009) have both highlighted the benefits of engaging pupils in discussion at these crucial lesson times. Furthermore, Thorburn (2010) found that many pupils (even those who eventually passed HSPE at a minimum level) were confused about overall course aims for large parts of their course. Thorburn & Collins (2003) advocate a strong brand of constructivist teaching for practical learning environments, otherwise there is a risk that many pupils will fail to comprehend the specific design parameters of their HSPE courses.

## Conclusions

The main purpose of the study was to investigate teachers' use of questions in two HSPE classes. Findings indicate that teachers used a range of questioning techniques. Just over half of questions asked were divergent, thoughtful questions. This suggests that a pupil-centred learning environment was adopted in tandem with the rationale of HSPE. Analysis of teachers' beliefs highlighted that they adopted strategies, such as peer teaching and assessment approaches, to create practical experiential and constructivist-inclined learning environments. However, both teachers also considered that classroom sessions were necessary to further develop pupils' understanding. The classroom session observed contained the greatest number of convergent, fact questions as well as the highest frequency of pupil questioning. These findings highlight that while the practical experiential learning rationale met with broad approval, there was still teacher unease with fully committing to it.

By focusing on only two teachers it is appreciated that it is not possible to generalize findings. Research using a larger sample of teachers over a longer period is merited given the continuing evidence of unease among teachers over confirming levels of understanding through prac-

tical learning approaches, especially when such understanding is assessed through written examinations. Such research is needed given that a previous review of national arrangements for HSPE in 2005 chose not to alter the brief guidance offered on teaching and learning in practical environments. This is despite the national profile of results continuing to reveal weaknesses in levels of pupils' analytical understanding (Thorburn, 2010). Furthermore, as HSPE is to be revised again for session 2014-2015, as part of a wider review of national qualifications, there is the potential for new related research to contribute to policy formation and to inform associated professional development. It would also be beneficial if such research could gain greater insight into pupils' perceptions of the value of discussions in awards containing high levels of practical experiential learning.

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**Authors:**

Malcolm Thorburn, Ph.D.  
University of Edinburgh  
College of Humanities and Social Sciences  
Moray House School of Education  
St Leonard's Land  
Holyrood Road  
Edinburgh EH8 8AQ  
Scotland  
Email: Malcolm.Thorburn@ed.ac.uk

Katrina Seatter  
Teacher of Physical Education  
Kilgraston School  
Bridge of Earn  
Perthshire PH2 9BQ  
UK  
Email: kseatter@kilgraston.com