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RECONCILING APPROACHES – A GAME CENTRED APPROACH TO SPORT TEACHING AND MOSSTON'S SPECTRUM OF TEACHING STYLES

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Abstract:

During the late 1960s and into the 1970s game-based approaches to sport teaching and coaching emerged in scholarly literature on sport and physical education teaching. Game based pedagogical approaches for games and sport teaching have been distinguished by some authors through the more prominent emphasis on guided discovery teaching and student/athlete reflective thinking than what occurs in the more historically common sport-as-sport techniques approach typified by a demonstration-replication, or 'transmission', method of instruction. However, guided discovery is also associated with another teaching approach that emerged in the 1960s, Style F of Mosston's Spectrum of Teaching Styles. In this paper we posit that rather than be seen as competing approaches, game-based approaches and The Spectrum of Teaching Styles should be seen as complementary as both are governed by a fundamental proposition – pedagogical decision making. In particular, due to the Spectrum of Teaching Styles non-versus approach, it is theoretically impossible/contradictory for the Spectrum to be in opposition to or compete against any pedagogical approach. Our purpose is to examine two Game Sense learning episodes and to identify the decisions being made between the teacher and student/s. This will then allow these two Game Sense learning episodes to be placed on the Spectrum of Teaching Styles. By doing this it will detail important pedagogical concepts and unify pedagogical decision making that take place when sport and games teaching is taken across the 'discovery barrier' and into an intentionally designed space to develop 'thinking players'. In the Australian educational landscape, this discussion is timely given the Australian Curriculum Health

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and Physical Education key ideas to focus on both content and pedagogies that are educatively focused with an inquiry approach.

Keywords: teaching, styles, physical education, Spectrum, game based, Mosston, Ashworth

1. Introduction

Internationally, game-based approaches provide a pedagogical framing for games and sport teaching. In the context of the work of the authors of this paper, in Australia the foregrounded expression of a game-based approach is the Australian Sports Commission (ASC) (1996) Game Sense approach (GSA). It is important to note, however, the GSA was not the first articulation of a game based pedagogical emphasis in Australia. Findlay (1982) released a text through the Physical Education Cooperative which described and advocated for a 'movement analysis approach' that advanced games teaching from the framework of movement and a focus on games as problem-solving activities rather than the 'first-up' teaching of discrete sport skills. Although not emphasizing an inquiry or problem solving pedagogy, Worthington (1974) proposed the game-based framework of principles of play taught through modified and conditioned games for soccer.

Today, game-based pedagogical approaches exist among a suite of pedagogical options for sport and physical education (PE) teachers. However, with the exception of Dyson, Griffin & Hastie (2004) synergies between game-based and other pedagogical approaches are rarely recognized as academics and practitioners advance the cause of their preferred approach. The consequence of such thinking is that the approaches fall into 'little boxes'. Pedagogical competition in scholarly literature and resultant pedagogical confusion for PE teachers is inevitable (Stolz & Pill, 2014), and does little to promote the long-called-for reform of PE pedagogical practice (see for example: Crum, 1983; Kirk, 2010; Locke, 1992). In this paper we adopt a 'non-versus' stance to explain the implications and benefits for pedagogical practice emanating from identification of aspects of similarity and alignment between a game-based approach such as the GSA and Mosston's Spectrum of Teaching Styles (Mosston, 1966) – which has been refined to The Spectrum of Teaching Styles (Mosston & Ashworth, 2008). The aim of this commentary is to detail important pedagogical concepts and theoretical concepts to recognize where commonalities exist.

There are many derivatives which fall under the banner of a game-based approach. In addition to the GSA, some examples are; Teaching Games for

Understanding (TGfU) (Bunker & Thorpe, 1982), a Tactical Games Model (TGM) (Griffin, Oslin & Mitchell, 1997), Play Practice (Launder, 2001), Tactical-Decision Learning Model (TDLM) (Grehaigne, Wallian & Godbout, 2005), Play with Purpose (Pill, 2007), and Games Concept Approach (Wright, Fry, McNeill, Tan, Tan & Schemp 2001). However, on a broader scale, we agree with the Breed & Spittle (2011) suggestion that game-based approaches can be generalized as:

> *"…playing the game (modified or adapted for the players' abilities) as the central organisational feature of a lesson. The modified games create constraints that emphasize certain game features in order to develop understanding as students solve the problems they are presented with."*
>
> (Breed & Spittle, 2011, p. 7)

Light (2013) suggested something similar, explaining that a loose framework of four pedagogical principles identifies game-based approaches. These pedagogical features are: 1. deliberate design of the game as a physical learning environment; 2. emphasising questioning to promote inquiry and interaction; 3. promoting inquiry through problem solving; and, 4. a supportive environment. It is the second of Light's four pedagogical principals that we argue distinguishes the GSA because, as mentioned earlier, the use of small-sided and modified games was an accepted pedagogy for games teaching prior to the explanation of the GSA, and also because teachers do not see small-sided and modified games, as in the GSA, as necessarily different to what they already do (Pill, 2011)

However, despite the success with acceptance in Physical Education Teacher Education (PETE) programs, there has been a slow acceptance of game-based approaches like the GSA in PE with practitioners. This may be due to the experiences of PE teachers in school classes and coaching sessions. For example, Moy, Renshaw and Davids (2014) found "*the traditional, reproductive approach was the most frequently reported approach experienced by QLD (Australian state) PETE recruits when being taught PE (90%) and coached in sport (84%)*" (p. 24). These results are consistent with previous studies of teaching styles used by Queensland PE teachers (Cothran et al., 2005; Sue See & Edwards, 2010) and provide more evidence of the experiences Australian school children have when being taught PE. It is this socialization process, known as acculturation, through past school experience, which Moy et al., (2014) believe has a powerful influence on "*prospective physical education teachers' beliefs and values about the subject, and how it should be taught, well before they begin professional socialisation or formal physical education teacher education (PETE)*" (p. 5). This process is not restricted to

Australia. A range of studies (Butler, 2005, Diaz-Cueto, Hernández-Álvarez, and Castejón, 2010, Evans and Light, 2007, Harvey, Cushion, and Sammon, 2015, Harvey and Jarrett 2014, and O'Leary, 2015) suggest there has been "*a lack of progress with the use of TGfU among preservice and experienced teachers and among participation and professional sports coaches*" (Kirk, 2016, 54). Launder (2001) suggests that the GSA requires more advanced pedagogical and content knowledge than the more historically common "*physical education method*" (Metzler, 2011) which is based on directive instruction (Light, 2013) and sport taught as sport techniques (Kirk, 2010). This assertion is supported by Howarth (2005) when she argues that teachers need not only knowledge about the game but also knowledge about how to make learning experiences which require appropriate cognitive demands on the learners to be active in the development of cognitive understanding. These demands are created through the questioning skills of the teacher and "*this lack of questioning and probing skills can be stultifying, even for those with considerable knowledge of the game*" (2005, p. 96).

This paper is timely as the Australian Curriculum Health and Physical Education (ACHPE) has identified inquiry approaches as a central educative feature of a strengths based HPE program, and problem solving as a general capability to be taught across all subjects (Australian Curriculum and Assessment Authority (ACARA), 2014). The authors argue that while inquiry approaches are emphasized as a key idea of the ACHPE, play or game-centred teaching and the purposeful pedagogical use of questions to promote thinking and inquiry in PE is not new. For example, Kuhrasch (2007) suggested that a play-teach-play approach be undertaken to foster critical thinking abilities in PE. This is not unlike the *game play-reflect and practice-game play* process of the GSA. Providing time to think and reflect on questions is also long identified with teaching for understanding (Johnson, 1997; Mauldon & Redfern, 1969). Game-based pedagogies have been identified as promoting inquiry and problem solving in games and sport teaching (Harvey & Light, 2015). Mosston's Spectrum of Teaching Styles (Mosston & Ashworth, 2002) is also identified as breaking the 'stimulus-response' mode typical of the common PE pedagogical expression (McBride, 1999).

Background

Game Based Approaches and the Game Sense Approach in Australia

In 1981 Mutton expressed concerns about the teaching status of PE in Australia to a parliamentary committee of enquiry into PE and Sport in schools. He concluded that "*vague notions of playing games and sports are no longer adequate attitudes towards physical*

education" (Mutton, 1981, p. 13). Australian PE teachers (not the curriculum documents) have often appeared to adopt a narrow definition of games and sport curricula that has resulted in a contradictory focus on developing sport techniques in units of work too short for the acquisition of sport skill for competent game performance. Consequently, it has been observed that many students finish the compulsory years of PE at Year Ten having discovered more about what they cannot do than developing feelings of self-efficacy towards participation in the substantive content form of many PE programs – games and sport (Alexander, 2008; Alexander & Luckman, 2001; Alexander, Taggart & Thorpe, 1997; Clennett & Brooker, 2006; Kirk, 1997; O'Connor, 2006).

Arising out of pedagogical concerns about games and sport teaching the Australian Sports Commission (ASC) implemented research into a game-based pedagogical approach. Working with Rod Thorpe of Loughborough University, the ASC developed the GSA. During March and April of 1996 Thorpe presented a series of workshops across Australia on a GSA to teaching and coaching games (ASC, 1996). Thorpe's involvement with the ASC development and demonstration of the GSA has led some to describe the GSA as an Australian version of TGfU (Light, 2013).

The key concepts of the GSA described by the ASC (1996) are:

- The game (or game form) becomes the focus and starting point of practice sessions
- The approach is learner orientated with the emphasis on developing thinking, self-motivated players;
- Games are adapted for specific reasons (for example, to exaggerate an aspect of play to emphasis a specific outcome, or to make games small sided to keep activity levels high); and
- Games can be categorized according to common principles of play, thus creating a games curriculum comprising Invasion, Net-Court, Striking-Fielding and Target games.

The GSA should not be confused with the use of 'game sense' as a synonym for game intelligence, which speaks to one aspect of player performance capability and usually perception-decision making ability rather than the definition of skill adopted within the initial scholarly Game Sense publications. In this literature, skill was explained as the complementarity of technical and tactical dimensions, defined by the equation: technique + game context = skill (den Duyn, 1997).

The GSA is also described as "*an active and reflective approach that nuances whole-part-whole practice by including active reflection and problem solving by playing with purpose*" (Pill, 2013a, p. 7). In short, if a teacher wanted to teach the push pass in the game of hockey (field), a teacher using a GSA may set up a small-sided game where two teams

are trying to push the ball over the opponents' goal line. The game will be confined to a small play space to encourage short 'push' passing. The game will be played in a small-sided (e.g., 4 vs 4) format to maximize game engagement and thus learning – i.e., providing potential practice volume via more opportunities for each player to make technical and tactical actions where there are less players. The teacher may apply constraints such as; no hitting the ball, or, the stick head cannot leave the ball before it is pushed. Students then attempt to solve the problem while playing the game. After a period of play the teacher will create the opportunity for reflection on the action using the questions as the pedagogical emphasis to encourage 'thinking players'. The ideas and learning emerging from this reflective moment will either be attempted by players in a return to game play, or play may pause for directed motor skill practice if it is identified during reflection that this is what is necessary to improve game play behavior. If directed motor skill practice is put in place for some or all of the players following the reflective moment, players will return to game play once the teacher is satisfied adequate movement remediation, modification or progression has occurred. It is essential to note, that even within the motor skill practice, player understanding is progressed by the teacher through the use of well-considered questions to bring players further towards understanding the technical and tactical movement requirements of the task and their transfer to the game.

The emphasis of game based approaches on teacher implementation of problem solving, reflection and inquiry processes has been described as a guided discovery (Breed & Spittle, 2011; Hopper & Kruisselbrink, 2001; Light, 2014; Pill, 2006). The term 'guided discovery' is also described by Style F of Mosston's Spectrum of Teaching Styles (Mosston & Ashworth, 2002). Generally, descriptions of the GSA as guided discovery do not specifically stipulate that the discovery of new knowledge must occur, rather they emphasize that the instructional strategy of questioning is central to stimulate thinking or intellectual engagement (Light, 2013) about the game instead of using didactic teaching approaches (Pill, 2013). While game based approaches like the GSA have been interpreted by some as (only) learning in games, the original description of the GSA (like other game-based approaches) did not rule in or rule out any particular instructional style, and specific to the GSA, just that "*the game (or game form) becomes the focus and starting point of practical sessions*" (ASC, 1996, p. 1). It also needs to be acknowledged that while some have described the game-based approaches 'game first' emphasis as reversing the skill teaching order (Butler & McCahan, 2005; Ireland & Urqhart, 2012), 'game first' was not new to game-based approaches. For example, Churcher (1971) outlined the two commonly accepted pedagogical expressions of games lessons as *skill practice leading to games* and *games- leading to practice-return to*

games. Indeed, the pedagogical expression of Maulden and Redfern's (1969) Games Teaching is similar to later game-based approaches such as TGfU, Tactical Games and GSA (Stolz & Pill, 2014).

While game-based approaches have shown certain benefits (Alison & Thorpe, 1997; Chen & Light, 2006; Pill, 2011; Turner & Martinek, 1999) a limiting factor in its adoption has been the perception that PE teachers "*simply lack the time needed to develop a deep understanding of the approach*" (Renshaw, Araujo, Button, Chow, Davids & Moy, 2015, p. 10). Some have suggested that the GSA may challenge the typical 'directive' ideal of a teacher who holds power and authority over the players by positioning the teacher as a facilitator through a particular emphasis on questioning (Light, 2013; Pill, 2007). Further, The Spectrum (Mosston, 1966) introduced Guided Discovery as a teaching style. Guided Discovery, or Style F, has been defined in The Spectrum as "*the logical and sequential design of questions that lead a person to discover a predetermined response*" (Mosston & Ashworth, 2002, p. 212). Some of the key features of Guided Discovery – Style F are that it is best done one on one as if other learners hear or see a response they can no longer discover and become receivers of the information (Mosston & Ashworth, 2008) or imitators (Metzler, 2011) and the discovery process is aborted. When this happens, or the target concept is known by the student "*the objectives of this behavior are nullified and the question and answer experience reverts to a design variation of the Practice style (a review)"* (Mosston & Ashworth, 2008).

The Spectrum of Teaching Styles (The Spectrum)

The Spectrum is a theory constructed from a proposition that "*teaching is governed by a single unifying process: decision making*" (Mosston & Ashworth, 2002, p. 8). In particular, and with regard to decision making, it is about who is making the decisions, when the decisions are being made and the intent of these decisions. Mosston and Ashworth (2008) suggest that there are 16 decision categories where either the teacher or student will be primarily responsible for the decision making. These decisions are made in all teaching events in three places or sets. The three sets are the pre-impact set (planning and preparation), the impact set (face to face implementation of the pre-impact decisions) and finally the post-impact set which includes "*feedback about the performance during the impact and overall evaluation of the congruence between the intent and the action of the learning experience*" (Mosston & Ashworth, 2002, p. 20). These three sets of decisions comprise the anatomy of any style and it is by identifying the decision making relationship which is occurring during these three sets that allows "*any teaching-learning interaction, model, strategy, or educational game*" (Mosston & Ashworth, 2008, p. 26) to be

identified, described and placed on The Spectrum of Teaching Styles. The Spectrum (2002) constitutes 11 teaching styles beginning with the *Command Style-Style A* and, through other identified styles, travels along to the *Self Teaching Style-Style K*. In *Command Style-Style A*, the teacher is making the maximum amount of decisions and the student the minimum. By the *Self Teaching Style-Style K* the teacher is making the minimum amount of decisions and the student is making the maximum. Put in another way, there is less teacher direction at the *Self Teaching Style-Style K* than there is at the Command *Style-Style A* (See **Figure 1**).

Responsibility for decision making

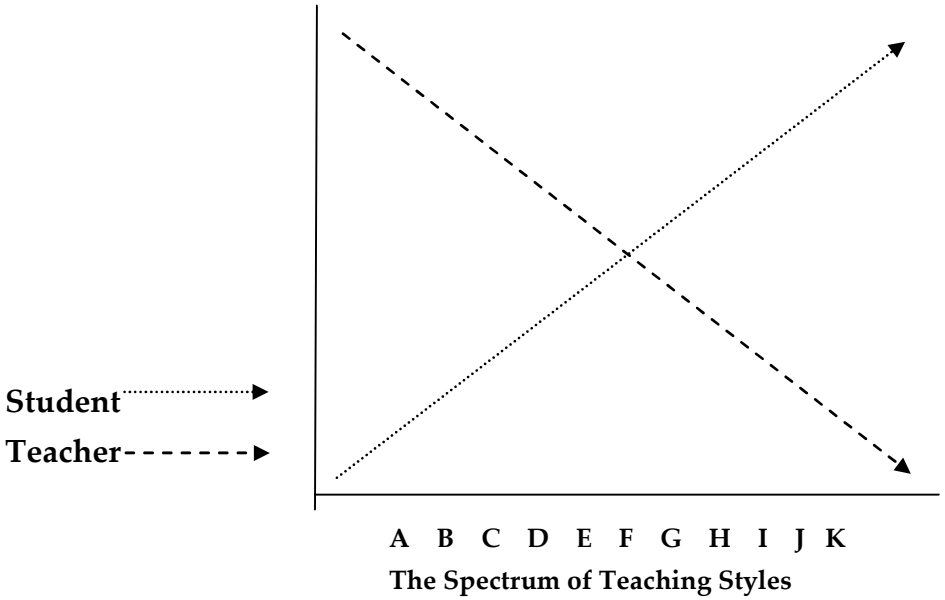

Figure 1: Mosston and Ashworth's Spectrum of Teaching Styles (2008)

As the teacher moves along The Spectrum their level of decision making changes from making the most decisions until they reach Style K where they will be making a minimum of decisions. In the case of the student the opposite occurs.

Discussion

We argue that one of the conceptual errors sometimes made in discussion about the GSA is that it is a 'game-only' approach. No teaching style is 'ruled in or ruled out' by the GSA, however, as we have earlier noted, and consistent with the genre of approaches referred to as 'game-based,' the GSA lessons will focus on game play and frequently will start with a game. To examine this game-based compared with game-only argument further, an example of the GSA will be scrutinized using The Spectrum

to identify the decision making which is occurring. In particular, who is making the decisions, when the decisions are being made and the intent of these decisions will be considered.

We will use The Spectrum to view two examples of learning episodes being taught using a GSA and place these episodes on The Spectrum in this discussion. We will do this from a 'non- versus' perspective in that evaluative claims about the episodes being 'good' or 'bad' will not be made. Evidence will be presented to support the claims based on the places where decisions are being made (pre-impact, impact and post-impact) and by who (teacher or student/s) and about what.

Game Sense Approach
Learning Episode 1: – The push-pass in Hockey (Field).
Learning Focus (Tactical Problem): – Push the ball over the opponents' line.
In pairs approximately 5 meters apart, students will play a game where they are trying to push a hockey ball over their opponent's line. Student A stands 5 meters from student B. Both students stand in between 2 markers which are 2 meters apart (the goal). Students attempt to push the ball over their opponent's line to score a point. Constraints applied such as no hitting the ball or stick head cannot leave the ball before it is pushed.
Focus Questions: – How do you position your hands on the stick to control your strike on the ball? Do you have greater control with one hand or two hands? What do you look at when you hit the ball?

Figure 2: Game Sense Approach for Field Hockey Push Pass
(Activity based on example provided in Pill, 2013)

In this learning episode, the teacher has decided that the student/players need to develop the skill of a push pass (as outlined above). The teacher may explain that the students/players will play a game where they push the ball over the opposition's line. Two students are standing five meters apart from each other. Student A stands between two markers which are approximately two meters wide and student B does the same. The teacher applies constraints such as no hitting the ball (as opposed to pushing it), or the stick head cannot leave the ball before it is pushed. Students then attempt to solve the problem or score a goal while playing the game.

When this episode is viewed through The Spectrum lens, it allows the decisions which are being made to become more prominent. This is represented below in **Figure 3**.

- **Pre-Impact:** – Teacher choses subject matter (push the ball over your opponent's line).
- **Impact Set:** – Students practice pushing a ball the way they have before. They were not instructed by the teacher to 'discover' or 'create' a way to propel the ball which they have not done before. They were most likely told: "The aim of this game is to push the ball over your opponent's line/goal."
- The **subject matter** is pushing the ball over the opponent's line.
- Students may be stopped during the **impact set** and asked questions using a Guided Discovery approach to help students identify problems experienced.
- **Post Impact:** – Teacher gives feedback about answers to questions.

Figure 3: The Spectrum analysis of GSA 1

In this situation the teacher chooses the subject matter in the pre-impact set. During the impact set the student/players are most likely using a technique to propel the ball which they have used before. Whether that grip is with their hands fairly close together as with a cricket shot or with their hands apart a little they will have used this grip before. This is assumed as nowhere does the teacher ask or direct the students to "*create a way to propel the ball which you have not used before*". If the teacher did ask the students to create, it could be suggested that they were directing the student to use creativity as the dominant cognitive operation. However, if the teacher does not instruct the student to use creativity then most likely the student will not and (based on the previously established point) will recall from permanent memory to working memory a method which has allowed them to be successful in the past. If the student has used a method which they have not used before, it would be creativity. For the teacher to claim that the student is using creativity due to their instructions would be contradicted by The Spectrum's central tenet that "*teaching is governed by a single unifying process: decision making. Every act of deliberate teaching is a consequence of a prior decision*" (Mosston & Ashworth, 2008, p.8). As the teacher has not directed the student to use creativity or discovery then the teacher cannot claim they have made this decision. Therefore, if the student has used one of these cognitive operations it is due to their free will and not due to the teacher decision.

When these instructions and this learning experience is viewed through The Spectrum lens it may be argued that the terminology or instructions being used is broad or non-specific about the cognitive direction they wish the student to take and the subject matter in the form of the motor pattern required to perform the task. The fact that the teacher has not asked the student to reproduce any subject matter (i.e., "*Push the ball like this*") but to "*Push the ball over the opponent's line*" suggests that this is the

subject matter and any method will do as long as it is within the constraints established. Ultimately, the students will be practicing a method of pushing the ball which they knew before the lesson. Based on these assumptions the students are still making the decision to reproduce subject matter deciding on pace, rhythm, amount of pushes as they would in Practice Style – Style B. The student is still practicing the skill. After the students have pushed the ball the teacher is likely to offer feedback about how the task was performed. This is also in line with the characteristics of Practice Style – Style B where "*the teacher moves from learner to learner, observing both the performance of the task and the decision making process, then offers feedback and moves on to the next learner*" (Mosston & Ashworth, 2002, p. 95).

After the completion of the push-pass game, the example outlined suggests that the students will come back to the teacher who can use a Guided Discovery approach to help players find answers to the problems experienced during play. The concept of the teacher using Guided Discovery to help players in the above scenario to find the answers is questionable when using The Spectrum definition or lens. As mentioned earlier, The Spectrum defines Guided Discovery – Style F as "*the logical and sequential design of questions that lead a person to discover a predetermined response*" (Mosston & Ashworth, 2002, p. 212). This means that when the teacher (or coach) asks a specific sequence of questions in a structured process, the student correspondingly responds until that student has discovered the only correct answer for each of the questions asked by the teacher. In short, there are two aspects which become questionable. The first questionable position is that in a class of 25 students that all learners are starting from the same/exact cognitive point or point of knowledge with regards to the push-pass. The second questionable aspect to consider is the processing speed of the 25 students when thinking and responding to the questions from the teacher. The students' processing speeds would all need to be identical (an unrealistic assumption) so that when the teacher asked the questions associated with using a Guided Discovery approach all 25 students would be able to discover the exact same predetermined response and discover it at the same time. Considering, as noted, how unlikely this is sequential questions will not lead all learners along the path towards the predetermined response at the same time. Thus all learners will most likely not reach the same point due to a lack of knowledge at the beginning of the task or the fact they may require other, or further, questions along the way. When The Spectrum is used to view an episode such as this it could be considered that the one student who is engaged in answering the questions is the one producing, or discovering, new knowledge (Mosston & Ashworth, 2008). The other students (who are maybe listening to the teacher's questions and students' responses) learn by reproducing the new knowledge that was

produced by the first student, and the overall teaching style for these students is generally Practice Style – Style B. Therefore, when The Spectrum is used as a lens to view this episode it can be concluded that for most students it would be Practice Style – Style B and for one student it would (could) be Guided Discovery Style – Style F.

The importance of determining students' knowledge before beginning a Guided Discovery episode is further supported by comments from Harvey and Light (2015) when they speak about *types of questions* and draw on the work of Kagan (2005) and describe questions as skinny or fat, high or low consensus or review and true questions. They suggest that "*review questions would be questions that simply ask learners to recall information, whereas true questions ask for more thought and detail in the answer*" (2015, p. 181). In the table below (**Figure 4**), and taken from their 2015 article, Harvey and Light suggest that the questions highlight various examples of 'question starters'; questions that might be used to encourage higher-order thinking from learners in a 'Piggy in the middle' 3 vs 1 possession activity" (2015, p. 181).

'Piggy in the middle' – 'question starters' and the types of thinking they generate.
• How are you deciding when is it best to make the pass and make use of the overload because you have the 'joker'? – Decision-making
• How could you improve your off-the-ball movement to make it easier for the person in possession of the ball? – Assessing
• What is the most important thing the players off the ball must do in order for them to Be successful in maintaining possession of the ball using the 'joker'? – Evaluating
• If you passed the ball harder to your teammate, what might happen? – Drawing conclusions/ inferring consequences.

Figure 4: Question starters for Piggy in the middle – Harvey and Light (2015)

It is not being suggested that the descriptions of what the questions are requiring the learners to do are inaccurate. Rather, it is argued that the notion of the question on its own requiring all learners to use the same cognitive operation (or that the question will be review or true questions), independent of the learner, is failing to acknowledge the difference in individual knowledge brought to the learning environment. For example, if one learner comes to the class with all of the required knowledge then any questions become review questions. All the questions require of a student with this knowledge is to recall (review) known answers. If a student comes to class without this knowledge, partakes in the 'Piggy in the middle' game, discover these concepts for the first time, then the questions asked may be more like the true questions which they describe and not review questions. Harvey and Light (2015) acknowledge the different amount of knowledge which learners may come with to the class when they make the claim that

"*at a given point in a game, individual learners may have different understandings of a specific incident based on their skills, knowledge, and prior experience*" (2015, p. 181). The point that is being argued here is that it is not the question on its own which determines whether a student is required to generate new knowledge (true questions) or recall (review questions) knowledge, it is a combination of the question and the knowledge which the student does or does not possess before the question is asked. It is this difference in knowledge between learners which makes it difficult to determine if all learners are discovering new knowledge and whether everyone or anyone is discovering at all.

With regards to guided discovery, and within The Spectrum conceptualization of Guided Discovery (as Style F), it is considered that "*there are cognitive liabilities when this style is used in a large group. The discovery process is interrupted per student in a group setting; therefore, the content acquisition cannot be guaranteed for each student*" (Ashworth, 2014). This is supported by Alfieri, Brooks, Aldrich and Tenenbaum (2011) who suggest that "*unassisted discovery-learning tasks involving hands-on activities, even with large group discussions do not guarantee that learners will understand the task or that they will come into contact with the to-be-learned material*" (p. 2). What perhaps would be more accurate to say is that in the GSA the teacher, at times, asks review questions or questions which ask the students to share responses based on reflections. At other times, they may be requiring one or some students to discover, but it is hard to claim that the questions are allowing or requiring all students to discover new knowledge. If the teacher's questions are based on reflection (where the learner knows the answer already) this implies memory has been used as the individual is being asked to reflect on something that has happened and has been learned. When The Spectrum is used to view an episode such as this it could be considered that the student who is engaged in answering the questions is the one capable of producing, or discovering, new knowledge (Mosston & Ashworth, 2008).

The concept to be considered here is that if a teacher presumed (incorrectly) that a student possesses specific knowledge or skills and the teacher asks questions or creates a learning experience that requires recall then it could be argued that the learning experience is not going to meet the lesson objective. However, if a teacher using the GSA or Guided Discovery – Style F is aware of the student's knowledge then they are more likely to accurately know who is discovering and who is recalling. This understanding should enable the teacher to then create learning experiences that cater for the learners needs based on their current knowledge and skill level.

It can be argued that the reason for the difference in definitions of Guided Discovery (or guided discovery) is likely due to the fact that The Spectrum and GSA pedagogies are underpinned by different philosophies and paradigms. A GSA is

described as an alternative approach of learning through guided discovery, or inquiry by the student, and characterized by its use of questioning (Breed & Spittle, 2011; Light, 2013; Pill, 2007). It is this questioning component in Game Sense that has been claimed to shift the teaching style towards guided discovery. As a loosely defined term in the GSA, this notion of guided discovery is based upon Bruner's (1961) classic position of discovery learning in educational psychology, which was similar in many ways to Dewey's (1938) experiential learning. Dewey noted that, "*the concept of education is a constant reorganizing or reconstructing of experience*" (Dewey, 2007, p.59). In the case of a GSA the guided discovery questioning helps the learner make meaning of what is happening, why it is happening and what they can/will they do about it. It can be suggested that whether this meaning making comes from memory or not, is of little consequence in guided discovery questioning, as it is the meaning that the student makes from their experience which is important. The description of guided discovery used in a GSA appears predicated on the placement of students as problem solvers (Hopper & Kruisselbrink, 2001; Pill, 2007) using the central pedagogical strategy of questioning (Light, 2013; Pill, 2007).

A guided discovery approach is claimed on behalf of game-based approached like the GSA as teachers are directed to the use of 'open-ended' questions (Mandigo & Corlett, 2010; Light, 2013, 2014; Pill, 2013; Richard & Wallian, 2005). Asking open-ended questions does not guarantee that any or all of the claims will occur. An open-ended question is usually considered a question which cannot be answered with a "Yes" or "No" response, or one correct answer. However, providing an open-ended question does not automatically lead to a presumption of sparking creativity, evaluation or analysis of understanding or opportunities. Merely suggesting that because the answer is open to many possibilities does not mean that the answer always needs to be investigated or explored, or that students will answer it in a particular way. For example, a teacher may ask the question; "*List three ways you can be dismissed as a batter in the sport of cricket?*", but in the response there is no discovery of new information. An individual either knows the answer or does not. In terms of a physical example, if the question is asked after an unsuccessful attempt (e.g., "*That pass did not succeed, what were your other options?*"), it is possible that the student will reflect (based on their memory) on what had just happened and answer the question without investigating or exploring. This view is arguable, as reflection comes from memory (as an event must have happened and be stored in memory), for a reflection to be able to take place. In this scenario, there will most likely be recalling (memory) of other known options. Similarly, if a whole class is asked what the other options are in this situation, and a large number of students already know what the other options are, then this will be a memory or

recall task – as the students who already know the answer will not investigate or explore something which they already know.

Research from sport lends support to the influential role that memory seems to play on successful decision making in sport. For example, some researchers have suggested that, with regards to knowledge, players draw on general knowledge about team sports and the sport being played, as well as remembered instructions from the coach when making a decision (Lenzen, Theunissen & Cloes, 2009). With regards to personal strengths they have suggested that "*players seemed to have acquired consciousness of their own resources and draw on such knowledge when making decisions in (a) game*" (Lenzen et al., 2009, p. 67). Perhaps one of the most telling aspects of the role memory plays when answering these questions (regarding what led to their success) was how they predicted what may happen in a game. The players based these predictions on "*knowledge about teammates' strengths and/or weaknesses, anticipation of what their teammates might do reflected collective aspects of decision making in team sports gained from playing together across time*" (Lenzen et al., 2009, p. 68). There is support for the view that when players are asked questions after the event has happened that they seem to rely heavily on stored memory. Therefore, the version of guided discovery described in GSA literature may be more like an example of review questions described in The Spectrum Practice Style – Style B than Guided Discovery – Style F.

We will now look at another GSA teaching episode and highlight that the GSA may, more appropriately, be considered a cluster of pedagogies (or styles) than the narrow description as guided discovery found in game-based approach literature. The game is described **Figure 5.**

Game Sense Approach
Learning Episode 2: – Keep away game increasing in complexity to scoring a point invasion game.
Learning Focus (Tactical Problem): – Keep possession of the ball
In teams of 3 in an area 10 meters by 5 meters you will try to string together as many passes as possible while the defenders attempt to intercept the ball. Progression activity can go to trying to score a try/touch down by taking the ball over the opposition's line.
After a period of time the teacher will stop the game and ask students to identify problems that you face and in groups of 3 come to appropriate solutions to deal with these. The teacher will facilitate the group discussion and students will test their solution in the game.
Focus Questions: – What problems did you face?
What solutions can you suggest to deal with these challenges?

Figure 5: Activity based on example provided in Light et al., 2014, p. 77

This example outlined is a game of 3 vs 3 in an area approximately 10 meters by 5 meters. Students are asked to either play a 'Keep away' (possession) game or a game where they are trying to take a ball and put in down over their opponents' line (invasion game). To use The Spectrum as a lens the breakdown of this game may look like **Figure 6** below.

Pre-Impact set – Teacher chooses and explains the game/rules etc.
Subject Matter – Students play a game of 3 vs 3 'keep away' game trying to complete as many passes as possible within the defined area and "identify problems".
Impact Set – Students play the game and during the game "identify problems".
Post Impact Set – Students recall what happened/problems and are "given time to arrive at appropriate solutions as a group" (Light et al., 2014, p. 77).
Possible problems identified could be: "I can't score/keep possession of the ball."
Is this discovery for all? – This is hard to guarantee.
The teacher has not instructed students to discover but 'identify' problems. Some may be discovering while others may be recalling known solutions.
Some students may recall and for others it may be new knowledge – but if they did not create then they are applying the knowledge/strategy of someone else.

Figure 6: Spectrum analysis of GSA episode 2

When this GSA episode is viewed through The Spectrum lens (**Figure 6**) a few factors emerge which help decide where it can be placed on The Spectrum. Firstly, students identifying problems does not suggest a specific cognitive operation. If a student had a large amount of knowledge from previous invasion or possession games they would be well aware of the problems (keeping possession and scoring) before they even began the game. Identifying a problem does not necessarily mean that a student has discovered that problem through playing this game. Based on this conclusion there may be discovery by one student and recall from the other two. A second factor to consider is that the teacher has not instructed students to discover problems but to identify. As a result some students may be discovering but again others may be recalling. As no specific cognitive operational instruction has been given to the students ("create" or "discover") and teaching is a chain of decision making, The Spectrum would not recognize that a deliberate decision has been made by the teacher for students to use this cognitive operation. Therefore, whatever cognitive operation the students are using is not based on teacher instruction but on their own free will or decision.

The next part which becomes problematic is that the teacher asked the students to "*arrive at appropriate solutions as a group*". This yet again is a very non-specific cognitive instruction. For example; Are the students allowed to use a strategy

previously known or do they have to create a strategy new to them? Even if one student in the group does create a new strategy it cannot be guaranteed that it is new to the other two students. If this is the case then one student is creating and the other two students will be recalling the first student's strategy. This learning episode bears similar characteristics to the first push-pass episode in that one student may be discovering (which in The Spectrum is Divergent Discovery – Style H) while other students listen and apply the discovery (Practice Style – Style B).

Based on this analysis of the learning episode and The Spectrum as a lens it is concluded that this episode could be two styles. Firstly, it could be Practice Style – Style B as some students are recalling known problems and strategies. They have not been directed to discover problems and many students may already know the problem. No students have been directed to create solutions ("*Arrive at appropriate solutions*") – nor can they potentially do so due to previous knowledge. For example, if student A already knew all possible solutions then they will be recalling even if student B and/or student C are creating and sharing with them.

Secondly, it is important to consider that this episode could be Divergent Discovery Style – Style H for some students. Style H is characterized by the student being required to "*discover divergent (multiple) responses to a single question/situation, within a specific cognitive operation*" (Mosston & Ashworth, 2008, p. 247). As Divergent Discovery – Style H is from the production cluster of The Spectrum students must be producing knowledge new to themselves – not recalling known information. If this definition is taken into consideration that the teacher instructed the students to "*Identify problems … and come to solutions as a group*" (Light et al., 2014, p. 77) the teachers' intent may have been for the students to use discovery and creativity. Maybe Student A did not have a great deal of invasion game experience and was discovering problems for the first time. If Student A discovered two or more problems the learning episode has hallmarks of Divergent Discovery Style – Style H. If students B and C already knew the strategy then the learning episode has characteristics of Practice Style – Style B as they are being told a strategy/s or are recalling a previously known strategy. As earlier noted, when students are in a group it is difficult for more than one to discover/create the same thing at the same time. So while one student discovers the other students will be told the strategy by the discoverer/creator. It may also be possible to consider that Student B may build on creation by Student A, but it would be difficult to claim that the two students discovered the same thing. It may be argued or suggested that they discovered parts of the same thing or filled in each other's missing parts of knowledge. Another factor to consider is that more than one student may create strategies, but if there are only a set number of strategies to discover and Student A and B discover all of

them; what is left for Student C but to recall information. Similarly, it would be difficult for the teacher to be able to identify who has created and who is recalling without prior knowledge of the students' experience of invasion games. So once again, as in the first episode outlined, and, as viewed through The Spectrum lens, the prior knowledge which the student brings to the learning experience plays a big part in assessing which style is being used in meeting the objectives of the teaching episode. As can be seen from the view provided through The Spectrum lens this second GSA episode could be Practice Style – Style B or Divergent Discovery Style – Style H based on the students' prior knowledge which they bring to the teaching episode.

Considerations

The Spectrum provides a framework with a very precise set of descriptions to allow "a common perspective, a number of undergirding concepts, and a functional language we can all use" (Goldberger, Ashworth & Byra, 2012, p. 269). This common language allows teaching approaches to be examined to see if they are doing what they claim they are doing. If a teaching approach claims that it is teaching discovery The Spectrum allows this to be examined and confirmed or denied. The Spectrum provides language so that teachers and students are not only speaking about the same thing but know what each other is required to do for recall, discovery or creativity to take place. This allows sports pedagogues to have a common language to use with their students to identify teaching–learning behaviors and to be able to teach these behaviors without confusion, or at the least, minimizing any confusion. If these important aspects, which separate one teaching style from another, are not able to be explained, then it serves to reason that it makes it difficult for the styles to be taught or understood.

Just as the music notation system (invented by Guido of Arezzo) allowed music to be recorded, taught and played just as the composer intended The Spectrum allows the teaching of styles as the teacher intended. Importantly, it must be remembered in the same way that the music notation system does not value one type of music style above another, neither does The Spectrum. It is this non-versus approach which allows teaching styles or approaches to be placed on The Spectrum without judgement of worth but with description of richness for what it can achieve.

Based on some of the instructions given in the episodes outlined it was difficult to state precisely where on The Spectrum they should be placed and some assumptions have had to be made. It has been argued that, in some cases, if the terminology used by the teacher was more specific then the placement on The Spectrum could have been made with more confidence or certainty. This is not a criticism specific to the GSA as

non-specific instructions or terminology can be given using any teaching style. We merely seek to highlight the importance of teachers using specific and mutually understood cognitive instructions at all times (using any style) so that students and teachers know what the expectations are and what is trying to be achieved. In making that claim, we are not arguing that the GSA or any other game-based approach is likely to be one style more than the other. We are concluding that these are the likely places where these two GSA episodes could be placed on The Spectrum when an analysis of the two scenarios was made in terms of the decisions being made by the teacher and students.

What is important to consider from this placement is that cognitive terminology needs to be agreed on and specific. Furthermore, teachers need to be aware (when deciding to use a teaching style to meet an objective), that they consider the knowledge which students bring with them to the episode and what they are trying to achieve. For example, if the teacher's objective for the lesson is to discover strategies then they may need to recognize that some students may already have a wealth of knowledge with regards to these strategies that the teacher wishes the students to discover. Consequently, those students will not be able to meet the objective if the same questions are asked to all students. However, such a claim does not mean that the teacher should not set that objective for some students. In this case, the teacher may group those who have the wealth of knowledge with regards to the strategies together and those who do not together. In the group with little knowledge of invasion games, the teacher may ask for students to individually write down the problems they identified and the solutions they came up with. The teacher could then circulate around the group to see what individual students have written down before they share their answers with the group. By doing this the teacher will have a better idea of who has discovered before they are potentially told answers by their group members. Once the discussion starts and the recalling of problems identified and solutions to these problems are shared, discovery is no longer occurring, it becomes students telling other students information or facts, and thus has the hallmarks of Practice Style – B review. In this way, one group may have some individuals discovering and one group may be recalling or practicing known skills.

To summarize, if teachers are not aware of their behavior and its effects (i.e., – the choice of teaching style, its effects and the lesson objective) then these three factors will not come together and function in the most effective way. Studies have shown (SueSee, 2012; Hewitt, 2014) that this phenomenon of incongruence between what teachers say they are doing and what they are observed doing is common and can lead to objectives of the lesson and subsequent syllabus or coaching guide documents not

being met. We concur with Good and Brophy (1997) that "teachers' lack of awareness about their behaviors or its effects lessen their classroom effectiveness" (p. 35).

We have shown that associations of game-based approached such as the GSA as guided discovery is not necessarily consistent with the description of Guided Discovery as Style F in The Spectrum. A common language can give "*a frame of reference, that "enables us to converse about teaching in a clear, efficient manner and to claim this jargon as our own—different from other teaching fields*" (Metzler, 1983, p. 146). However, the importance of any teaching–learning relationship is not the naming of but the set of decisions that lead to the educational objectives (Mosston and Ashworth, 2008)

Conclusion

In this paper we have used The Spectrum as a lens to analyze two learning episodes typical of descriptions of a GSA in the literature. The Spectrum was used as a lens as it allowed discussion of "*the specific decisions, who makes them, how they are made, and for what purpose they are made, leads to insights into the structure of the possible relationships between teacher and learner and the consequences of these relationships*" (Mosston & Ashworth, 2008, p. 20). The discussion explained that, as the learning experiences were presented, each of these example episodes could be placed on The Spectrum in two different places respectively. Overall, the conclusions were that the first GSA episode could be Practice Style – Style B, Guided Discovery Style – Style F and the second GS episode could be Practice Style- Style B or Divergent Discovery Style – Style H.

It is important to remember that we have not set out to critique a GSA and have recognized its ability to create motivation and involvement for learners by providing an environment where the contextualized practicing of motor skills, strategies and cue recognition is fostered. The purpose of this article was not to argue that one teaching style is superior to another or that because GSA may be categorized as Practice Style – Style B (or any style from The Spectrum for that matter) it is inferior or subordinate to it. The GSA has been viewed through the lens of The Spectrum and used the decisions being made by the student/s or teacher to categorize GSA in the examples provided on The Spectrum as mostly Practice Style – Style B, and depending on the students previous experience when they participate in the lesson, Guided Discovery Style – Style F or Convergent Discovery Style – Style H. The Spectrum of Teaching Styles can be used to place any teaching style on The Spectrum based on the central premise that teaching is a chain of decision making and that every deliberate act of teaching (including not making a decision) is a result of a previous decision. Where these decisions are made (pre-impact, impact and post-impact) and by establishing by who

they were made, what they were made about and the when is what makes it possible to establish which one of the eleven landmark teaching styles is being used. It is The Spectrums consistent use of terminology and this axiom of decision making which allows all teaching styles to be placed somewhere on The Spectrum and to be all valued for their individuality and what they can achieve. These two factors are also what allows The Spectrum lens to identify that, while a GSA approach may be thought of as one teaching approach, in the examples outlined it has potentially reflected two different teaching styles on The Spectrum. Depending on the context and the objectives of a task there is room for different styles and combinations of styles. It is worth remembering that no one teaching style is superior to another, and as the non–versus premise of The Spectrum suggests; "*all behaviours contribute to educational objectives*" (Mosston & Ashworth, 2008, p.20).

This article has been about highlighting the styles and features of two episodes taught using a GSA based on the decisions being made by the teacher and students. The authors have concluded that these two example episodes can mostly be described as Practice Style and on occasions represent Guided Discovery for perhaps one student (episode 1). With regards to the second episode presented there may be some individuals being taught using Divergent Discovery depending on their knowledge which they brought to the learning episode. Under the non–versus approach there is no reason why a GSA and The Spectrum would not co-exist as The Spectrum values all teaching styles. The Spectrum is not an instrument to judge teaching styles worth, but a theory that allows teaching styles to be described based on the decisions which are being made by the students and teacher. Based on this The Spectrum has only served to highlight the strengths of a GSA. The ability of The Spectrum to not only define all teaching styles but also value all teaching styles for what they can achieve (through its articulation of a common language and understanding of teaching styles) is essentially what makes it such a valuable model.

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