

Investigating the Teaching Styles of Tennis Coaches Using The Spectrum

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It is unknown what teaching styles (range of pedagogies) coaches are employing during coaching sessions and whether these teaching styles are associated with recommended pedagogical principles advocated by sport and coaching scholars. It is unknown whether twenty years of coach education has shifted coaching practice as the insights into the pedagogical diversity and preference of teaching styles that underpin and inform the coaches' decisions to employ particular teaching strategies during coaching sessions are undetermined. This paper addresses these unknowns in the field of tennis coaching in Australia by reporting the findings of a study that address the lack of information on the teaching styles employed by tennis coaches by asking the following research question: What teaching styles are junior coaches in Australia actually using during coaching sessions? This study used *The Spectrum* (Mosston & Ashworth, 2008) of teaching styles as a tool to assess the observed teaching styles of twelve junior coaches. Contrary to the educational convictions of Australian sport coach education materials the results from this study indicated that the coaches in this study potentially did not offer players developmental opportunities beyond a limited range (i.e., motor skill development in the physical learning domain) due to a narrow pedagogical mix in their coaching.

Keywords: Tennis, coaching, teaching, styles, spectrum

A common principle in the discipline of sports coaching is that coaches should base their teaching styles on a number of considerations. These include: the developmental characteristics and individual requirements of the player, as well as the subject matter intent. Apart from anecdotal reports, however, the subject of Australian tennis coaches and teaching styles remains largely unexplored. It is unknown what teaching styles coaches are employing during coaching sessions and whether these teaching styles are associated with recommended pedagogical principles. The insights with regard to teaching styles that underpin and inform the coaches' decisions to employ particular teaching styles during coaching sessions are equally undetermined.

Australian sport has advocated the Game Sense approach (den Duyn, 1996) as the pedagogical framing of coaching since the mid-1990's. However, it is unknown what teaching styles (or, range of pedagogies) coaches are employing during coaching sessions and whether these teaching styles are associated with recommended pedagogical principles advocated by sport and coaching scholars. It is unknown whether twenty years of coach education has shifted coaching practice as the insights into the pedagogical diversity and preference of teaching styles that underpin and inform the coaches' decisions to employ particular teaching strategies during coaching sessions are undetermined. As diverse learning conditions and experiences, and thus the 'approach' of the coach, are often created by employing different teaching styles the necessity for coaches to understand and purposefully implement a range of teaching styles to achieve various learning aims and objectives is vital. This is certainly evident in scholarly and sport specific coaching material associated with the Australian Game Sense approach (Light, 2013).

In this paper, teaching styles is synonymous with pedagogies and instructional strategies. The requirement for a tennis coach to possess the capacity to employ a range of teaching styles when appropriate to task expectations is perhaps reliant on a number of considerations. Coaches must be prepared to cater for the diversity of players' learning needs, interests, preferences and developmental readiness or stage of learning. Additionally, tennis involves learning aims and objectives from the psychomotor (physical/motor skill), cognitive (decision making) and affective (enjoyment/motivation) domains. As no one teaching style encompasses all learning eventualities (Mosston & Ashworth, 2008), an effective coach must have the capability to change, combine and transition between various teaching styles during sessions; albeit perhaps in the Australian context within a common approach, the Australian Sport Commissions Game Sense approach underpinning its philosophy of Playing for Life.

To understand fully the holistic nature of sports coaching and to aid in the investigation of the teaching styles that tennis coaches employ, quantitative and qualitative research methods have been employed in this study where 12 junior tennis coaches were observed to assess their teaching styles during three 30 minute tennis practice sessions. As well as these observations, an additional coach participated in an extended observational period of 18 hours of coaching at their local tennis club. In order to assess the pedagogical range employed by coaches the study used *The Spectrum* (Mosston & Ashworth, 2008) of teaching styles as a tool to assess the observed pedagogical landscape of the coaches. *The Spectrum* consists of 11 landmark teaching styles that function as indicators that represent considerably different teaching and learning experiences.

A substantial gap exists between the production of progressive and contemporary research evidence and its application in coach education (Farrow, Baker & McMahon, 2008; Williams & Hodges, 2005), contradicting findings from research emerging from the field of skill acquisition, motor learning and performance (Farrow et al., 2008; Williams & Hodges, 2004, 2005). Research has indicated that a traditional pedagogy that is exemplified by being highly directive or autocratic and prescriptive remains the most employed instructional practice in many sports among coaches of elite players (Miller, 1992; Millard, 1996; Kahan, 1999; Cushion & Jones, 2001; Williams & Hodges, 2005; Potrac & Cassidy, 2006; Potrac et al., 2007; Ford et al., 2010; Harvey, Cushion & Massa-Gonzalez, 2010; Partington & Cushion, 2011).

Methodology

The observations of coaches practice sessions as a tool to cultivate richer understanding of the coaching process and to identify the teaching styles of coaches within practice environments is acknowledged (Potrac et al., 2000). The employment of observation is commonly acknowledged as a valuable tool for delivering quantitative descriptions of coaching behaviour (Darst, Zakrajsek, & Mancini, 1989; DeMarco, Mancini, Wuest, & Schempp, 1996). Observation can provide baseline data of actual (demonstrated in the coaching environment) teaching styles. However, observational tools can only measure what the tool is designed to “see”.

Participants came from the provision of a contact name and phone number if individuals wished to participate in this study, provided during a survey of Australian tennis coaches teaching styles carried out prior to this observational study (authors, 2016). From the 208 coaches who completed an earlier survey questionnaire, 56 volunteered to participate in this research. Of the 56 coaches who volunteered 12 were purposefully chosen to participate in three 30 minute observations who were completing a Junior Development (JD) coaching accreditation course.

As part of their accreditation coaching course, the coaches were required to perform three 30 minute on-court sessions that are designed to assess their understanding of the course content and level of coaching competency using a Sony HDRPJ760V HD camcorder. The camera was attached to the back fence of the tennis court at an approximate height of two metres. The three 30 minute observations occurred at different stages during the coaches' participation in an accreditation course. These sessions were video-recorded for this study using a Sony HDRPJ760V HD camcorder. Prior to the commencement of each session the coach informed the players that the session would be video-recorded. It was further explained to the players that the exclusive purpose of video-recording the session was to observe coaching behaviour and not to assess their playing ability. Coaches wore a wireless lapel microphone during their sessions for a clear, detailed and accurate auditory recording. Based on this feedback, it is acknowledged that the coaches may have adjusted their behaviour during the early stages of the observations. The footage from the video-recorded observations was stored on the lead researcher's password protected personal computer.

The coaches were observed and video-recorded coaching three tennis sessions of 30 minutes duration with four junior beginner players. Each coach supplied their own players for each session. As the JD accreditation course was designed to prepare coaches to deliver sessions to beginner junior players each session focused on coaching a different junior age group in addition to teaching different content. The specific focus of each session in the JD accreditation course was:

- Session 1: Groundstrokes (forehand and backhand) and rally with a tactical theme with 5-8 year old players.
- Session 2: Transition (approaching the net) and net play (volleys and overheads) and rally with a tactical theme with 8-10 year old players.
- Session 3: Serve and Return of Serve and rally with a tactical theme with 10-12 year old players.

The observations conducted in this study were distinctly defined and observable based on *The Spectrum* (Mosston & Ashworth, 2008). As the focus of the study was the teaching styles that tennis coaches employed during their coaching sessions, the critical behaviour was evidently identifiable and observable. Training with of the observational tool was also implemented. This included: numerous trial coding sessions. A limitation of observational research relates to what some researchers suggest as certain behaviours not being able to

be “evaluated as finely as some observation forms dictate” (Thomas, Nelson & Silverman, 2001, p. 286). However, referring to the Identification of Classroom Teaching-Learning Styles Instrument (Ashworth, 2004) assisted in minimising this limitation claim. This tool was applied to assist decisions concerning the teaching style being employed rather than evaluate the effectiveness of its application. Ashworth asserts that the Identification of Classroom Teaching-Learning Styles Instrument (Ashworth, 2004) “does not determine the fidelity or the appropriateness of the teaching-learning approach, but rather it identifies which of the Spectrum landmark teaching-learning styles the classroom behaviour most resembles” (Ashworth, 2004, p. 1).

The recorded tennis sessions were analysed using Ashworth’s Identification of Teaching-Learning Styles Instrument (Ashworth, 2004). In order to code and record the coaches’ teaching behaviours during sessions, the Instrument for Identifying Teaching Styles (IFITS) (Curtner-Smith, 2001) coding sheet was used (Figure 1) in conjunction with the Identification of Classroom Teaching Learning Styles Instrument (Ashworth, 2004).

Interval Teaching Style

1 A B C D E F G H I J K

2 A B C D E F G H I J K

3 A B C D E F G H I J K

4 A B C D E F G H I J K

5 A B C D E F G H I J K

6 A B C D E F G H I J K

Figure 1 An example of a section from the IFITS coding sheet.

This coding instrument has been successfully implemented in other studies (Hasty, 1997; SueSee, 2012) to determine the amount of time that teachers dedicated to employing various teaching styles. The coding procedure employed in using IFITS (Curtner-Smith, 2001) consisted of a ten second observation proceeded by a ten second recording of this observation. In other words, every 20 seconds a decision regarding which teaching style the coach was using or whether they were engaged in a *Class Management* activity. *Class Management* is time the coach is involved in activity that is not directly related to instruction. This

study implemented the *Class Management* categories that Hasty (1997) and SueSee (2012) implemented in their research. These studies employed an assemblage of *Class Management* activities that were defined by the Physical Education Teacher Assessment Instrument (Phillips, Carlisle, Steffen & Stroout, 1986). The *Class Management* categories included: time spent commencing and concluding classes, organising and managing equipment, attending to student behaviour, and any alternative duties other than instruction.

In the event that two or more teaching styles were utilised during an interval of time, the teaching style that resided closest to the *production* end of *The Spectrum* (Mosston & Ashworth, 2008) would be recorded. For instance, if Command Style-A and Practice Style-B were both observed during a ten second observation period then it would be recorded as Practice Style-B. The work of Hasty (1997) provided the impetus to employ this procedure whereby “the least didactic i.e., more student-centered teaching style is given preference and recorded” (p. 45). It is worth noting here that in *The Spectrum* it is incorrect to suggest that Style A is not student-centered, any style can be or cannot be student-centered as it depends on the classroom ‘teacher-learner’ interaction. If a teaching style and a *Class Management* task were being employed simultaneously during a ten second observation (such as moving markers) the teaching style was afforded precedence and coded. Percentages and rate per 20 seconds for each teaching style were calculated and totaled. The use of percentages has been used in a number of other coach behaviour studies (Potrac, Jones & Armour, 2002; Smith & Cushion, 2006; Potrac, Jones & Cushion, 2007; Ford, Yates & Williams, 2010) and has been recommended as a reliable variable (Ford et al., 2010).

The reliability and validity of the observation instrument

In order to examine the reliability and validity of the observation instrument a pilot study was undertaken. Six youth tennis coaching sessions of 30 minutes duration were video-recorded at a local tennis club. To scrutinise inter-observer agreement, the researcher and an independent trained coder, who also participated in the coding of the larger study, watched video-recordings of each of the 30 minute coaching sessions alone and at separate times during a single week. To account for intra-observer reliability, the lead researcher watched video-recordings of each coaching session on two separate occasions. For intra-observer agreement, there was a one week gap without any access to the video-recorded sessions between the first and second observation. Darst et al. (1989) recommend a one week interlude is recommended to permit memory lapse to occur. Inter-observer and intra-observer agreement were calculated using the equation (agreements/ (agreements + disagreements) x 100 (van der Mars, 1989). For time-motion analysis, inter-observer agreement was 98.3%

and intra-observer agreement was 97.3%. These figures correspond with the recommendations of subsequent researchers, who regarded an agreement score of 85% or higher to deliver appropriate reliability (Rushall, 1977, van der Mars, 1989). The reliability and validity of the observations in the larger study was also assured by inter-observer and intra-observers' agreement, with a 30-day interval, from Bellack's formula (1966 as cited in van der Mars, 1989). According to the minimum value given in the literature, ten percent of the total observations was analysed for each behaviour (Tabachnick & Fidell, 1989). The minimum value found was 92% for intra-observer agreement.

The lead researcher and the second individual who was trained in the coding process coded the video-recorded sessions. Both the lead researcher and second coder had experience as CP coaches, with over 10 years' experience. The second coder extensively studied *The Spectrum* (Mosston & Ashworth, 2008) theory and was additionally trained by the researcher prior to coding the participants. To expedite inter-observer reliability, both coders practised coding with IFITS (Curtner-Smith, 2001) for extended periods of time. Practice consisted of coding live and video-recorded sessions. As all the coaches' sessions were video-recorded, it was possible for the coders to pause the recordings at any stage to facilitate discussion. In the event that the coders were unable to accurately match the coaching behaviours with the landmark teaching styles on *The Spectrum* (Mosston & Ashworth, 2008) Prof. Sara Ashworth was consulted.

Reliability is critical when design decisions are being made based on observations, and essential for allowing researchers to accurately communicate their findings. Lack of reliability in observations can indicate that observers are missing important details, that they are not categorising observations in the same way, or that what appeared to be similar circumstances are actually not. The formula that was used in this study to estimate inter-observer reliability and agreement divides the number of agreements in behaviour coding by the sum of the agreements and disagreements (Thomas et al., 2001, p. 190).

Inter-observer agreement were calculated for the larger study using the above equation (agreements/ (agreements + disagreements) x 100 (van der Mars, 1989). The lowest recorded level for inter-observer agreement for the 12 coaches three 30 minute sessions (n=36 sessions) was 97.6% and the highest was 100%. These figures correspond with the recommendations of subsequent researchers, who regarded an agreement score of 85% or higher to deliver appropriate reliability (Rushall, 1977, van der Mars, 1989). Inter-observer agreement was also calculated using the above equation for the extended observations of the single coach (n=18 hours). The lowest recorded level for inter-observer agreement for the 18 hours of coaching was 95.8% and the highest was 98.8%. These

calculations also parallel the recommended inter-observer agreement scores of 85% or higher to provide suitable reliability (Rushall, 1977; van der Mars, 1989).

Findings

The results in this section of the study provide a description of the 12 coaches' observed employment of teaching styles during their three 30 minute coaching sessions. In addition, the findings concerning the single coach who were observed for an extended length of time are also outlined. Table 1 shows the participant breakdown of the range of teaching styles observed during the 12 coaches' three 30 minute coaching sessions (n=36 sessions).

Participant	Teaching styles that were observed during the 12 participants' three 30 minute coaching lessons (n=36 lessons)
Participant 1 Junior Development	Landmark teaching style Command Style-A Landmark teaching style Practice Style- B • Canopy design Command Style-A* • Canopy design Practice Style-B*
Participant 2 Junior Development	Landmark teaching style Command Style-A Landmark teaching style Practice Style- B • Canopy design Command Style-A • Canopy design Practice Style-B
Participant 3 Junior Development	Landmark teaching style Practice Style-B • Canopy design Practice Style-B
Participant 4 Junior Development	Landmark teaching style Practice Style-B • Canopy design Practice Style-B
Participant 5 Junior Development	Landmark teaching style Command Style-A, Landmark teaching style Practice Style- B • Canopy design Command Style-A • Canopy design Practice Style-B
Participant 6 Junior Development	Landmark teaching style Practice Style-B • Canopy design Practice Style-B
Participant 7 Club Professional	Landmark teaching style Practice Style-B • Canopy design Practice Style-B
Participant 8 Club Professional	Landmark teaching style Command Style-A, Landmark teaching style Practice Style- B • Canopy design Command Style-A • Canopy design Practice Style-B

Participant 9 Club Professional	Landmark teaching style Command Style-A, Landmark teaching style Practice Style- B • Canopy design Command Style-A • Canopy design Practice Style-B
Participant 10 Club Professional	Landmark teaching style Command Style-A, Landmark teaching style Practice Style- B • Canopy design Command Style-A • Canopy design Practice Style-B
Participant 11 Club Professional	Landmark teaching style Command Style-A, Landmark teaching style Practice Style- B • Canopy design Command Style-A • Canopy design Practice Style-B
Participant 12 Club Professional	Landmark teaching style Command Style-A, Landmark teaching style Practice Style- B • Canopy design Command Style-A • Canopy design Practice Style-B

Table 1. Participant breakdown of the range of teaching styles observed during the coaches’ three 30 minute coaching sessions

The 12 coaches were observed implementing two landmark teaching styles. These were landmark teaching style Command Style-A and landmark teaching style Practice Style-B. The coaches were also observed performing a variation of landmark teaching style Practice Style-B as well as a variation of landmark teaching style Command Style-A. For clarity, the researchers will be referring to this situation where more than one style was evident a “canopy design” in the tables and text of this paper using the following terms in italics.

- *Canopy design Command Style-A.*
- *Canopy design Practice Style-B.*

Canopy designs approximate the decision structure of the landmark teaching style(s) they are located near or between. Reasons for this discrepancy may be due to the employment of only three 30 minute coaching sessions, content of the sessions, age and ability of the players and the number of players in the group. Despite both coders having extensive practice with the coding tool and that the reliability and validity of the observations were assured by inter-observer and intra-observers’ agreement, it is possible that inconsistencies were evident with regard to the coding of the sessions. Despite the many canopy designs that exist on *The Spectrum* (Mosston & Ashworth, 2008) this study identified only two.

All 12 coaches were observed using landmark teaching style Practice Style-B as well as a canopy design that approximates the behaviour of this landmark teaching style (*canopy design Practice Style-B*). A total of eight coaches were observed employing landmark teaching style Command Style-A in addition to a variation of this landmark teaching style (*canopy design Command Style-A*). A depiction of the breakdown of total time (%) that the participants (n=12) employed these teaching styles during their three 30 minute coaching sessions is displayed in Table 2.

Teaching Style	Percentage of time that teaching styles were observed from the 12 coaches' total sessions (36 sessions)
Command Style-A	0.18%
• Canopy design Command Style-A*	10.40%
Practice Style-B	12.87%
• Canopy design Practice Style-B*	71.38%
Reciprocal Style-C	0%
Self-Check Style-D	0%
Inclusion Style-E	0%
Guided Discovery Style-F	0%
Convergent Discovery Style-G	0%
Divergent Discovery Style-H	0%
Learner Designated Individual Program Style-I	0%
Learner Initiated Program Style-J	0%
Self-Teaching Style-K	0%
Class Management*	5.15%

Table 2. The breakdown of total time (%) that the 12 participants (six JD and six CP coaches) were observed using teaching styles during three 30 minute coaching sessions.

As a percentage of total time observed, the results from the 12 coaches indicated that they employed landmark teaching style Practice Style-B for 12.87% of the time and landmark teaching style Command Style-A for 0.18% of the time. The 12 coaches were also observed performing two canopy designs. *Canopy design Practice Style-B* was observed for 71.38% of the time and a variation of landmark teaching style Command Style-A (*canopy design Command Style-A*) was observed for 10.40% of the time. *Class Management* activities were observed for 5.15% of the time. These activities consisted of the coach arranging equipment on the tennis court between activities. For instance, placing *markers* to indicate where players will position themselves during activities.

In order to compare the observed teaching styles of coaches, a depiction of the breakdown of total time (%) that the coaches were observed implementing various teaching styles during their three 30 minute coaching sessions is shown in Table 3. This table includes the breakdown of total time (%) percentage of all coaches (n=12) who were observed for comparison.

Teaching Style	Percentage of time that teaching styles were observed from the 12 coaches' three 30 minute coaching sessions (36 sessions)
Command Style-A	0.18%
• Canopy design Command Style-A*	10.40%
Practice Style-B	12.87%
• Canopy design Practice Style-B*	71.38%
Reciprocal Style-C	0%
Self-Check Style-D	0%
Inclusion Style-E	0%
Guided Discovery Style-F	0%
Convergent Discovery Style-G	0%
Divergent Discovery Style-H	0%
Learner Designated Individual Program Style-I	0%
Learner Initiated Program Style-J	0%
Self-Teaching Style-K	0%
Class Management*	5.15%

Table 3. The breakdown of total time (%) that the participants were observed using teaching styles in addition to the breakdown of total time (%) of all coaches who were observed (n=12).

The results outlined in Table 3 show remarkable similarities among coaches with reference to the amount of time that teaching styles were observed during the three 30 minute coaching sessions. These results may validate the accuracy of the coding instrument as well as the coders employed in this study. Coaches were also observed employing behaviour that approximated the decision structure of landmark teaching style Command Style-A. The coaches employed *canopy design Command Style-A* for similar amounts of time during their three 30 minute coaching sessions. The observed practice showed a dominance usage of landmark teaching style Practice Style-B.

All the coaches involved in the observations agreed to permit the researcher to use the findings from Stage 1 of this study – survey questionnaire, and the observations to compare findings. The findings from Stage 1 have been published elsewhere (Authors, 2016). The survey questionnaire asked the coaches to indicate the teaching styles they believed they employed during their coaching sessions throughout the year. The results of these findings are summarised in Table 4. The comparison between the percentage of time that teaching styles were observed from the three 30 minute coaching sessions (36 lessons) and the self-identified teaching styles of the is shown in Table 8. Differences are evident between the self-identified and observed teaching styles among the 12 coaches. In addition to the 12 coaches implementing landmark teaching style Command Style-A (0.18% of the time) and landmark teaching style Practice Style-B (12.87% of the time), teaching behaviour that approximated the decision structures of these landmark styles were also observed. A variation of landmark teaching style Command Style-A was observed for 10.40% of the time (*canopy design Command Style-A*), while a variation of landmark teaching style Practice Style-B was observed for 71.38% of the time (*canopy design Practice Style-B*). These figures are contrasted with the self-identified usage of landmark teaching style Command Style-A (50%) and landmark teaching style Practice Style-B (66.6%). Despite the coaches indicating that they used seven other landmark teaching styles including: Reciprocal Style-C (25%), Self-Check Style-D (25%), Inclusion Style-E (33.3%), Guided Discovery Style-F (66.7%), Convergent Style-G (33.3%), Divergent Discovery Style-H (50%) and Learner Designated Individual Program Style-I (8.3%), no other landmark teaching styles were observed among the 12 coaches. The findings, however, illustrate compatibility between what the coaches self-identified and what was observed between Learner Initiated Program Style-J and Self-Teaching Style-K. In this case, a percentage score of zero was recorded.

Teaching Style	Percentage of time that teaching styles were observed from the 12 coaches' three 30 minute coaching sessions (36 sessions)	Percentage of 12 coaches who self-identified using the teaching styles: often to most of the time
Command Style-A	0.18%	50%
• Canopy design Command Style-A*	10.40%	NA
Practice Style-B	12.87%	66.6%
• Canopy design Practice Style-B*	71.38%	NA
Reciprocal Style-C	0%	25%

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Self-Check Style-D	0%	25%
Inclusion Style-E	0%	33.3%
Guided Discovery Style-F	0%	66.7%
Convergent Discovery-G	0%	33.3%
Divergent Discovery Style-H	0%	50%
Learner Designated Individual Program Style-I	0%	8.3%
Learner Initiated Program Style-J	0%	0%
Self-Teaching Style-K	0%	0%
Class Management*	5.15%	NA

Table 4. A comparison between the percentage of time that teaching styles were observed from the 12 coaches three 30 minute coaching sessions (36 sessions) and the self-identified teaching styles of the 12 coaches.

The results suggest that tennis coaches believe they employ a range of teaching styles during coaching sessions throughout the year. Yet after observing the 12 coaches during three 30 minute sessions in addition to the single coach during 18 hours, a total of two landmark teaching styles were observed. Variations that approximated the decision structure of landmark teaching style Command Style-A and landmark teaching style Practice Style-B were also evident during all the coaches' observed sessions. The results clearly indicated a discrepancy between the coaches' action and intent.

The video-recorded sessions of the 12 coaches during three 30 minute observations revealed two teaching styles from the reproduction cluster. As a percentage of total time observed, landmark teaching style Command Style-A was observed for 0.18% of the time, and landmark teaching style Practice Style-B was observed for 12.87% of the time. A variation of landmark teaching style Command Style-A was also observed for 10.40% of the time, in addition to behaviour that approximated landmark teaching style Practice Style-B (71.38% of the time). No other landmark teaching styles or variations were observed.

From the extended observational period of 18 hours with the single coach, two landmark teaching styles were also observed in addition to variations (canopy designs) that approximated these landmark teaching styles. As a percentage of total time observed, landmark teaching style Command Style-A was employed for 1.61% of the time, and landmark teaching style Practice Style-B was observed for 13.42% of the time.

Discussion

Despite all the coaches who participated in the observations self-reporting the use of all teaching styles from the *reproduction* and *production clusters* of *The Spectrum* (Mosston & Ashworth, 2008) at some point during their coaching sessions throughout the year, when the video-recorded sessions were coded, two landmark teaching styles from the *reproduction cluster* were observed. These were landmark teaching style Command Style-A and landmark teaching style Practice Style-B. As a percentage of total time observed, the 12 coaches indicated that they employed landmark teaching style Practice Style-B for 12.87% of the time or for a total of 2.3 hours and landmark teaching style Command Style-A for 0.18% of the time or 1.9 minutes during their three 30 minute sessions. Among the 12 coaches, no other landmark teaching styles were observed. It could be argued that the exclusive use of these landmark teaching styles by the coaches in this study was not entirely unanticipated. To some extent, the results support anecdotal evidence pertaining to the instructional processes that tennis coaches employ during coaching sessions. It was surprising, however, that landmark teaching style Command Style-A was not employed more frequently by the coaches during their video-recorded sessions. It was equally unexpected that the coaches did not implement any teaching styles in the *production cluster* of *The Spectrum* (Mosston & Ashworth, 2008) during their coaching sessions.

During the observations, the coaches were also observed performing teaching behaviour that approximated two landmark teaching styles in the *reproduction cluster* of *The Spectrum* (Mosston & Ashworth, 2008). It is acknowledged at this time that the variations that approximated the landmark teaching styles, termed canopy designs, were not provided as an option on the survey questionnaire for the coaches to consider and choose from. Rather, these teaching behaviours were subsequently identified during the observations and were included to understand the exact learning behaviour that was occurring during the coaching sessions.

As outlined earlier, two canopy designs were identified during the coaches' observations and subsequently labelled in this study. These were:

- Canopy design Command Style-A minus (-) pace and rhythm.
- Canopy design Practice Style-B plus (+) a social partnership to complete the task.

The abbreviated notation for canopy design Command Style-A minus (-) pace and rhythm is A-P&R. The abbreviated representation of canopy design Practice Style-B plus (+) a social partnership to complete the task consists of: B+socialisation. The assigned labelling for A-P&R means that this particular teaching episode follows the decision structure of landmark teaching style Command Style-A while omitting the decision of pace and rhythm (P&R). In this case, the learner made the decisions with regard to speed or how quickly or slowly they decided to perform the task or activity. A common teaching episode or scenario of this variation during the coaches' observed sessions consisted of the following:

1. The coach demonstrated the serving action to the players in the group.
2. The players then copied or reproduced this action, imitating the cues and performance of the coach.

In this teaching scenario or episode, the coach made all the decisions relating to: subject matter, location (where the task is to be performed), posture, starting time, stopping time, duration and feedback. The only decision the coach did not make was the pace and rhythm (P&R) of the task or activity. The players decided how quickly or slowly they performed the serving activity.

The labelling for B+socialisation means that this teaching episode adheres to the decision structure of landmark teaching style Practice Style-B while adding the element of socialisation. The added decision of socialisation does not form part of the decision structure of landmark teaching style Practice Style-B. Instead, individual and private practice of a task or activity is a requirement of landmark teaching style Practice Style-B. An example of this variation that was frequently observed during the coaches' video-recorded sessions consisted of:

1. The coach explained the activity that involved the practice of the forehand and backhand groundstroke and encouraged players to comment.
2. The players then practised this task with a partner.

In this teaching scenario or episode, the coach made all the decisions regarding the subject matter and logistics of the task, as well as providing private and individual feedback to the players. The players made the decisions relating to: location, the order in which the task is to be practised, starting time, pace and rhythm, stopping time, and initiating questions for clarification. The added decision in this scenario was socialisation. Rather than practicing the task privately and individually, the players practised the task with a partner.

During the three 30 minute observations, the 12 coaches performed the canopy design that approximated landmark teaching style Command Style-A (A-P&R) for 10.40% of the time or 112.32 minutes (1.87 hours) in addition to the canopy design that approximated landmark teaching style Practice Style-B (B+socialisation) for 71.38% of the time. This equated to 12.48 hours from a total of 18 hours.

Notwithstanding the congruence between the teaching styles in the *reproduction cluster* of *The Spectrum* (Mosston & Ashworth, 2008) that the coaches believed that they employed and what they actually used, some inconsistencies were evident. A noticeable discrepancy was realised between the self-identified use of teaching styles in the *production cluster* of *The Spectrum* (Mosston & Ashworth, 2008) and what was evident during the observations. Regardless of the reported use of teaching styles in the *production cluster* by tennis coaches, none were actually observed. Guided Discovery Style-F was the most commonly reported teaching style from *often* to *most of the time* among the 12 tennis coaches (66.7%). This outcome suggests that there is a lack of congruence between the teaching styles in the *production cluster* of *The Spectrum* (Mosston & Ashworth, 2008) that tennis coaches believe that they use and what they actually use. This assertion is based on the *scenario descriptions*. All the coaches who participated in this study were observed providing high levels of direct and prescriptive instruction to players during their coaching sessions. However, it has been highlighted that their exist potential advantages of employing less prescriptive and direct forms of instruction (Masters, 2000; Masters & Maxwell, 2004; Williams & Hodges, 2005; Wulf, 2007).

Although the provision of direct instruction is considered a critical component of the coaching process, some researchers have recommended caution with being excessively prescriptive and direct during practice for extended periods of time (Davids, Button, & Bennett, 2008; Williams & Hodges, 2005). The frequent application of verbal instructions, demonstrations, and feedback is claimed to generate an excessive amount of information for players to process, thereby preventing them from engaging in the problem solving process. This aspect, however, was not explored in this study. Furthermore, it has been asserted that the explicit nature of the content is readily forgotten and interrupts automatic motor processes, particularly when the learner becomes exposed to stressful and anxious situations (Jackson & Beilock, 2008; Masters, 2008). It is also suggested that an overly prescriptive approach to instruction and feedback may result in a subordinate recollection and transfer of skill to competition when compared with a method where verbal instruction, demonstrations, and feedback are provided less habitually (Hodges & Franks, 2004; Wulf & Shea, 2004). In response to these asserted limitations, a more *hands-off* and implicit approach to

instruction has been encouraged (Renshaw, Chow, Davids & Hammond, 2010). In order to achieve these outcomes, a focus on employing teaching styles in the *production cluster* of *The Spectrum* (Mosston & Ashworth, 2008) would seem appropriate. The teaching styles in this *cluster* represent options that invite the production (discovery) of new knowledge. These styles also accentuate the development of decision making skills and advocate the learner participating in tactical problem-solving and the decisions regarding the *how*, *why* and *what* of student learning. These styles include coaches or teachers facilitating or guiding players to explore options through pedagogical techniques such as questioning. This is in contrast to the coaches' current behaviour of constantly telling or directing the players during coaching sessions in this study. However, as diverse learning conditions and experiences are often created by employing different teaching styles, the necessity for coaches to understand and implement purposefully a variety of teaching styles to achieve learning outcomes would seem paramount. This strongly suggests that tennis coaches should assess the learning objectives of the session and employ the most appropriate teaching style(s) rather than exclusively implementing the same teaching style repeatedly.

As outlined previously, tennis involves learning aims, objectives, skills and knowledge from a number of domains including: the psychomotor (physical/motor skill), cognitive (decision making), and affective (enjoyment/motivation) domains. This might indicate the application of specific teaching styles to develop comprehensively each learning area. According to Morgan (2008), developing physical skills in the psychomotor domain is the “most obvious one and should involve the development and application of core techniques and skills and the application of these to competition-specific situations” (p. 11). In this case, implementing teaching styles in the *reproduction cluster* is considered most appropriate. Goldberger, Ashworth and Byra (2012) have suggested that landmark teaching style Practice Style-B and its many associated canopy designs located in the *reproduction cluster* of *The Spectrum* (Mosston & Ashworth, 2008) present a highly effective teaching style in achieving basic motor acquisition (Goldberger et al., 2012). If, however, developing the cognitive domain is a priority, Morgan contends that teaching styles in the *production cluster*, such as Guided Discovery Style-F, may be more suitable. The importance of adopting appropriate teaching styles to cater for the requirements of a particular learning domain is recognised (Goldberger et al., 2012).

The results of the observations and the information above would indicate that the coaches in this study were not committing sufficient attention to developing the cognitive versatility of their players. This domain represents knowledge of tactics, strategies and decision making during game-play as well as in technique development. The coaches in this study employed the same

landmark teaching styles and canopy designs throughout each coaching session thereby repeatedly reinforcing the same set of learning behaviours and objectives. This shows that coaches did not vary the teaching styles that they employed during coaching sessions. This presumes that the coaches know how to teach using alternative styles. As a result of their limited use of teaching styles, the coaches did not offer players developmental opportunities beyond a limited range (i.e., motor skill development in the physical learning domain). There often exists a range of objectives across a number of learning domains that practitioners are attempting to develop. It is therefore recommended:

the more comfortable and competent a teacher is in using a variety of pedagogical approaches available (including different teaching styles) the more effective they could potentially be – mobility ability, the skill of easily moving from one teaching style to another as circumstances suggest, is what we wholeheartedly endorse. (Goldberger et al., 2012, p. 274)

As no one teaching style encompasses all learning eventualities, an effective coach must have the capability to change, combine and transition between various teaching styles during sessions. Furthermore, it is strongly advocated that the behaviour of coaches act as an avenue to link player understanding to the content presented in the session (Hall & Smith, 2006). Therefore, it is crucial that coaches “consider the objectives of the session, so that he or she can determine whether given behaviours are relevant to the task” (Lyle & Cushion, 2010, p. 52). Effective coaches have the ability to “tailor their content and instruction to the specific learning readiness and interests of their students, by integrating concepts and implementing teaching strategies that are responsive to the students’ diverse needs” (Lyle & Cushion, 2010, p. 52). In order to design an optimal learning environment, coaches should be “less concerned about a coaching style or behaviour and more concerned about whether whatever they do impairs or facilitates learning” (Lyle & Cushion, 2010, p. 53). Coaches who possess the capacity to be receptive and flexible, and who can differentiate among their instructional practices are ideally positioned to augment learning outcomes for all their players (Cain, 1989). For that reason, “there is no one size fits all approach” (Lyle & Cushion, 2010, p. 54).

Conclusion

In spite of the speculation and anecdotal evidence surrounding the frequent use of particular teaching styles, empirical research was necessary to reveal definitively the precise coaching behaviours of tennis coaches. An important factor that impacts on the quality of coach education, in addition to research in the field of pedagogy, is the capacity to identify and to differentiate reliably one teaching style from another (Ashworth, 2010). As diverse learning

experiences are shaped by instigating different teaching styles, it is vital that the information and skills required to differentiate various teaching styles are constant and dependable (Ashworth, 2010). Indicating the distinction between landmark teaching styles and canopy designs in this study was imperative to understanding the exact behaviour that was occurring during the coaches' sessions. It also permitted the determination, with greater accuracy, the level of congruence between what the coaches believed that they did and what they actually did.

If the observed sessions can be taken as indicative of the coaching practice of the coaches, the results showed that the Australian tennis coaches in this study do not use a range of teaching styles during their coaching sessions. The coaches were primarily observed employing a canopy design that approximated the decision structures of landmark teaching style Practice Style-B. This study also indicated a lack of congruence between the landmark teaching styles that coaches' reported using during their coaching sessions throughout the year and the landmark teaching styles that they actually used. The survey questionnaire respondents reported using all of the landmark teaching styles on The Spectrum (Mosston & Ashworth, 2008). When the video-recorded sessions of the coaches were coded, a total of two landmark teaching styles was actually observed. As a percentage of total time observed, the results from the 12 coaches indicated that they employed landmark teaching style Practice Style-B for 12.87% of the time and landmark teaching style Command Style-A for 0.18% of the time. The 12 coaches were also observed performing two canopy designs. A variation of landmark teaching style Practice Style-B (Canopy design Practice Style-B) was observed for 71.38% of the time and a variation of landmark teaching style Command Style-A (Canopy design Command Style-A) was observed for 10.40% of the time. Among the 12 coaches, no other landmark teaching styles or canopy designs were observed.

The results from the extended observation period (18 hours) of the single coach revealed that as a percentage of total time, landmark teaching style Practice Style-B was observed for 13.42% of the time, and landmark teaching style Command Style-A was employed for 1.61% of the time. This coach was also observed using two variations of the landmark teaching styles. Canopy design Practice Style-B was employed for 72.05% of the time and canopy design Command Style-A was used for 9.44% of the time. No other landmark teaching styles or canopy designs were observed. The observed landmark teaching styles and canopy designs strongly correlated with the pedagogical principles associated with direct instruction guidelines. Direct instruction is commonly represented by the coach making decisions about what the students are learning in addition to how and why they are learning it.

Although not originally planned or intended, this study, due to the type of and nature of the data that was collected, has provided the first account of research pertaining to canopy designs. It has also provided empirical evidence of the existence and employment of canopy designs during coaching sessions. In achieving these outcomes, this study has not only contributed to the current body of research that has employed The Spectrum (Mosston & Ashworth, 2008) (theory-testing) but has also extended the theoretical conception of this educational framework (theory-building).

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