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**Variations in acculturation and Australian PETE students'
receptiveness to an alternative pedagogical approach to games
teaching**

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Background: The development of intelligent, thinking performers as a central theme in Physical Education curriculum documents worldwide has highlighted the need for an evolution of teaching styles from the dominant reproductive approach. This has prompted an Australian university to change the content and delivery of a games unit within their Physical Education Teacher Education (PETE) course and adopt a productive student centred approach that is compatible with current curriculum directives. The significance of prospective physical educators' biographies on their receptiveness to this pedagogical innovation was studied to help recognise and understand potential differences and subsequently guide programme development to help improve the impact of teacher education.

Purpose: To investigate whether past school and sporting experiences are powerful influences on Australian PETE recruits' initial perspectives about effective physical education teaching practice and their receptiveness to an alternative pedagogical approach.

Participants and Setting: 49 first year pre-service PETE students (53% male; 47% female; mean age 18.88 ± 1.57 years) undertaking a compulsory unit on games teaching at an Australian university volunteered to take part in the study and were grouped according to their highest level of representation in games, either school/club ($n=13$), regional ($n=20$), or state/national ($n=16$). Students experienced the constraints-led approach as learners and teachers during an 8-week games unit informed by nonlinear pedagogy and underpinned by motor learning theory.

Data collection and Analysis: Prior to the commencement of the unit participants completed part A of a two part mixed response questionnaire aimed at gathering data about their physical education and sporting background. The data were summarised using descriptive statistics. Pre and post intervention, participants completed part B responding, via Likert Scale with their opinion of the importance of each sub-component of the traditional reproductive style for an effective games teaching session. This resulted in a traditional reproductive games teaching belief score. For each sub-component, participants were invited to respond in more detail to justify their opinions. A one-way between groups analysis of variance (ANOVA), Tukey's HSD Post Hoc Test and a two - tailed, paired samples t test were used to analyse the quantitative data. Content analysis was used to analyse the qualitative data.

Findings: The traditional, reproductive approach was the most frequently reported teaching approach used by the physical education teachers and sports coaches of participants in all groups. Prior to the commencement of the alternate games unit, participants in each representative level group held very strong custodial traditional reproductive games teaching beliefs. After experiencing the alternative games unit there were statistically significant differences in the traditional reproductive games teaching belief mean scores for each group. This combined with participants' qualitative responses indicated a receptiveness to the alternative pedagogy.

Conclusions: The results of this present study show that, contrary to previous research undertaken in North America, in Australia, it is possible for PETE educators to change beliefs in order to overcome the constraint of acculturation and provide PETE students with the knowledge, understanding and belief in an alternate approach to teaching games in physical education compatible with curriculum documents.

Keywords: acculturation; physical education; physical education teacher education; nonlinear pedagogy; perspectives;

Introduction

The UK National Curriculum Physical Education (NCPE) and USA National Association for Sport and Physical Education (NASPE) emphasise the development of independent and thoughtful performance and incorporate outcomes in the psychomotor, cognitive, and affective domains of learning in their definition of a physically educated person (Metzler 2005; Byra 2006). Additionally, innovative pedagogical approaches that facilitate a more rounded education of children through games have been advanced by some physical educators, for example Teaching Games for Understanding (Bunker & Thorpe 1982) and Sport Education (Siedentop 1998).

In line with thinking across the world, the development of intelligent, thinking performers is also a central theme in the Physical Education Senior Syllabus in Queensland, Australia. The Queensland Studies Authority (QSA) states that ‘intelligent performance is characterised by high levels of cognitive functioning, using both rational and creative thought. Students are decision makers engaged in the active construction of meaning through processing information related to their personal experience and to the study of physical activity’ (QSA 2010, 3). However, there is some evidence to indicate that Queensland physical education teachers continue to use highly reproductive teaching styles characterised by isolated drills and de-contextualized practices (see Mosston & Ashworth 2002; Martens 2004). For example, in a local study of Queensland physical education teachers by Sue See and Edwards (2010), data were collected through direct observation of teachers’ instructions rather than exclusively self-reporting as used in previous research (Cothran et al. 2005). They found that, despite the vast majority of Queensland physical education teachers self reporting that they used a range of both reproductive and productive teaching styles ‘here and there to most of the time’, actual observations of teaching revealed that Queensland physical

education teachers predominantly used reproductive styles, particularly the 'practice' style from Mosston's Spectrum of Teaching Styles (1966).

It is important to understand why Queensland physical education teachers continue to utilise traditional reproductive teaching methodologies, despite verbal reports to the contrary. One answer may lie in occupational socialisation theory. Occupational socialisation is a theoretical framework that has guided researchers in understanding why teachers teach physical education as they do (Lawson 1983a, 1983b, 1986, 1988; Templin & Schempp 1989; Schempp & Graber 1992; Stroot 1993). Lawson (1986, 107) defined occupational socialisation as 'all kinds of socialisation that initially influence persons to enter the field of physical education and later are responsible for their perceptions and actions as teacher educators and teachers'. He proposed a number of hypotheses which attempted to explain how and why three distinct types of socialisation, acculturation, professional socialisation, and organisational socialisation, were likely to shape American physical education teachers' perspectives and the pedagogical practices they employed (Lawson 1983a, 1983b). The socialisation process of acculturation or past school experience appears to have 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) (Hutchinson 1993).

Of prime importance in this socialisation process are prospective teachers' observations and interactions with physical education teachers and coaches while experiencing school life and physical education and sport. Lortie (1975, 61) termed this aspect of experience the 'apprenticeship of observation' (Templin 1979; Dewar & Lawson 1984; Mawer 1996; Curtner-Smith 1999). Lortie (1975, 39) proposed that, through the internalisation of many years of observing teachers in physical education

classes, teacher recruits develop specific views of what constitutes good pedagogical practice and they enter teacher education programmes thinking that they hold a 'subjective warrant to teach'. That is, they believe that they already know what they need to be able to do in order to teach. Compounding this view is the fact that many prospective physical education teachers have had extensive, enjoyable and successful backgrounds in physical education and sport prior to entering a course of study in PETE (Doolittle, Dodds, & Placek 1993; Wright, McNeill, & Butler 2004; Sofu & Curtner-Smith 2005). Consequently, these recruits have a strong interest in a custodial approach to teaching, the result being that they anticipate teaching in a manner similar to how they were taught (Lortie 1975; Lawson 1983a; Bain 1990). These custodial beliefs are somewhat resistant to change (Lortie 1975). Introducing new innovative teaching styles during a recruit's professional socialisation is not easy as it challenges the maintenance of the physical education *status quo* of a teacher-driven, reproductive paradigm.

Although these key socio-cultural constraints on behaviour present a challenge, focusing on the next generation of teachers via a PETE programme is a good place to start an evolution of teaching styles to encompass approaches that are more in line with current curriculum directives. According to Light (2002) pre-service teacher (PT) education programmes offer a point in the professional development of teachers at which they might be encouraged to embrace innovation in physical education teaching. This idea was confirmed in a study involving Australian university graduates who identified relevant, research-led teaching that introduced them to new, innovative concepts and ideas as important components of their university experience (Scott, 2005). However, before introducing an innovative pedagogy it is important that teacher educators have a better understanding of who their recruits are and what their prior experiences and perspectives are about teaching, schooling, sport and physical

education. This knowledge is important since initial beliefs of teaching recruits influence their receptivity to messages received in teacher education (Lawson 1983a; Pajares 1992; Cothran, Kulinna, & Ward 2000).

Specifically, the level and type of sport played prior to entry into PETE appear to be important constraints in determining teaching recruits' receptiveness to innovation. Lawson (1983a) noted that 'sport has been identified as a carrier of conservative values', which led him to hypothesise that perspectives formulated during acculturation produced two types of recruits who entered professional socialization with varied receptiveness to innovation (Lawson 1983a, 1983b). PETE recruits who attended schools with high quality PE programmes, and had limited involvement and achievement in traditional interschool sport, he suggested would tend to be attracted to teaching physical education not coaching (a teaching orientation). Many of them will possess an innovative orientation and are more likely to be inducted, that is internalize and adopt a belief in the perspectives and practices espoused by PETE faculty (Lawson 1983a; Dewar & Lawson 1984). Other PETE recruits, who had participated and achieved at a high level in traditional, interschool sports at schools in which sport performance was prioritised over physical education instruction, he suggested would tend to be attracted to coaching not teaching (coaching orientation). Additionally, Lawson hypothesised that many of these recruits were likely to be extremely conservative in their orientation towards physical education, possess a custodial orientation and were unlikely to be inducted.

Lawson's hypothesis has been supported by research conducted by Sofu & Curtner-Smith (2005, 2010), and Stran & Curtner-Smith (2009b) who found that PTs acculturation mediated their receptiveness towards an alternate pedagogy model presented during teacher education. Specifically they found that PTs oriented toward

teaching changed their beliefs much more easily about teaching physical education during PETE than those orientated toward coaching. However, they found that it was still possible for PETE to induct a PT with a weak or moderate coaching orientation, but those with strong coaching orientations remained more resistant. Contradicting these results Curtner-Smith (1997a, 1997b; 1998) found that it was possible to partially induct PETE students who entered programmes with strong coaching orientations. However, as each of these studies involved only two PETE students, conclusions about the influence of PETE programmes on PTs need to be made with caution and generalisations cannot be made.

There is a need for researchers to further study the significance of prospective physical educators' biographies on their receptiveness to innovative PETE programmes. It would help teacher educators to recognise and understand potential differences in the receptiveness of PTs to new pedagogical approaches and subsequently guide programme development to help improve the effectiveness and impact of teacher education. To date, the type of recruit studied in the literature appears to be mainly restricted to coaching- and teaching-oriented individuals from the United States of America who are typically products of a 'non teaching' physical education culture, where the students play games and the teacher supervisors or referees (Curtner-Smith 1997a, 1997b, 1998,1999; Sofo & Curtner-Smith 2005, 2010). Socialisation theory and some research suggest that Australian recruits are products of a different, traditional reproductive physical education teaching culture. It would be interesting then to investigate their beliefs about how physical education should be taught on entering a PETE programme and their subsequent receptiveness to an alternative pedagogical innovation when it is introduced into a PETE programme. Since many Australian recruits seem to be successful products of this traditional reproductive culture, it would

logically follow that they would be strongly committed to a process that worked effectively for them and would, therefore, be less receptive to new ideas. To date no study exists that specifically looks at the previous sporting success of PETE recruits, who are products of a reproductive teaching approach, as a sole acculturation mediating factor to receptiveness to a pedagogical innovation during PETE.

An alternate pedagogy

Given the Queensland Physical Education Senior Syllabus definition of the intelligent performer (QSA 2010, 3) a viable alternate teaching approach is needed that is specifically suited to developing a high level of cognitive functioning in individuals. Nonlinear pedagogy, underpinned by the constraints-led approach, is an innovative pedagogy that provides the necessary theoretical framework for facilitating learning design that would support the development of intelligent, thinking games players (Davids, Chow, & Shuttleworth 2005; Chow et al. 2007; Renshaw et al. 2010). This student-centred pedagogy provides physical educators with a sound theoretical model of the learner and of processes of learning underpinned by motor learning theory based on the ideas and concepts of ecological psychology and dynamical systems theory (see Chow et al. 2009; Renshaw et al. 2009; Renshaw et al. 2010; Chow et al. 2011). Nonlinear pedagogy is based on the learner conceptualised as a nonlinear dynamical system (Davids et al. 2005). It recognises the emergent nature of learning by empowering learners to individually and actively explore and solve game problems and make decisions in representative practice environments shaped by practice task constraints that facilitate the emergence of functional movement solutions (Davids, Button, & Bennett 2008; Chow et al. 2009; Pinder et al. 2011). This approach has been shown elsewhere to provide a theoretical underpinning for other student-centred

approaches to learning, such as Teaching Games for Understanding (TGfU) (Bunker & Thorpe 1982) (see Chow et al. 2009). In accordance with the expectations of the Queensland Physical Education Senior Syllabus, the performance contexts within lessons may be considered ‘authentic’ (QSA 2010, 29). This is because technical, decision making and perceptual skills are developed in faithful simulations of team game performance environments where constraints such as field size, player density and game rules are manipulated, with all key information sources representative of the game present (Renshaw et al. 2010).

Aims of the Study

The principal aim of this study was to investigate whether past school and sporting experiences are powerful influences on PETE recruits’ perspectives and initial personal beliefs about effective physical education teaching practice and their receptiveness to an alternative pedagogical approach, as captured by Lawson’s (1983a, 1983b) physical education socialisation theory of acculturation. Specifically we sought to test the hypothesis in a Queensland (QLD) context by identifying the physical education teaching and coaching approaches that PETE recruits have predominantly been exposed to, and which have subsequently influenced their initial personal physical education games teaching beliefs. In line with Lawson’s (1983a, 1983b) model of physical education teacher socialisation we expected that QLD PETE recruits would hold strong custodial, traditional physical education games teaching beliefs and would anticipate teaching in a manner similar to how they were taught, leading to the continuity of traditional ‘reproductive’ practice in physical education in Queensland schools. We also expected that performance level of sport played prior to entry into PETE would mediate their receptiveness to innovation, with those playing at higher

representative levels being more resistant to a new pedagogical approach. These findings would have important implications for teacher educators who present PETE recruits with an alternative pedagogical approach to teaching games that is aligned with curriculum document objectives across the world. A secondary aim of the study was to provide more self reported evidence regarding how Australian high school students are taught physical education.

Method

Instrument Development (Questionnaire)

A two part questionnaire was developed, the first part consisting of short open-ended and closed response questions aimed at gathering data about the PETE students' gender, current year of degree, and date of birth, physical education and sporting background including their competitive games playing experience and how they were taught and coached in games. To identify the physical education and coaching approach that the participants were exposed to prior to entry into PETE, they were asked to choose a description of an approach that was closest to the predominant method used by their physical education teachers and coaches. Three alternative models were given each based on common teaching and coaching approaches identified in the literature (see Table 1). Studies (Bunker & Thorpe 1986; Launder 2001; Cothran et al. 2005) have clearly identified the existence of a dominant, traditional, reproductive skills based approach to games teaching/coaching. This approach (alternative A) is characterised by a focus on the teaching of specific skills and technique within a highly structured lesson usually following the format of a general warm up, demonstration of the 'ideal model',

repetitive practice of the 'ideal model' in isolated drills with teacher giving corrective verbal feedback and a concluding game where students apply skills learned (Allison & Thorpe 1997; Martens 2004; Queensland Department of Education 1977; Mosston & Ashworth 2002). Alternative B was modelled on the Game Sense approach, which is the Australian variation of the TGfU model (Bunker & Thorpe 1982). The distinctive aspects of this approach are the use of modified and conditioned games to develop games players' tactical awareness and decision making, with the teacher/coach acting as a facilitator using questioning to promote problem solving and decision making (Den Duyn 1996). Alternative C was modelled on what Crum (1993) referred to as a 'non-teaching ideology', reportedly common among physical education teachers in the United States (Stran & Curtner-Smith 2009a) and identified within Australia (Morgan & Hansen 2008). Referred to as 'game supervisors', 'newspaper readers' and 'free play monitors', the key characteristics of this approach are that the students play games and the teacher supervisors or referees.

The second part of the questionnaire consisted of six short descriptive statements that were based on each of the sub-components of the dominant, traditional, reproductive skills based approach to games teaching/coaching, i.e. general warm-up consisting of a run and stretching, visual demonstration and verbal instruction of the desired 'ideal' performance model, repetitive isolated skill drills, and continuous corrective verbal feedback compared to an 'ideal' movement response (Queensland Department of Education 1977; Allison & Thorpe 1997; Mosston & Ashworth 2002; Martens 2004). The statements required participants to respond with their opinion of importance for an effective games teaching session via a 5-point Likert Scale (5-very important to 1-not at all important). After each question, participants were invited to

respond in more detail by providing a written explanation to support and justify their opinions.

Validity and Reliability (Questionnaire)

A process similar to that used by many authors (Cothran, Kulinna, & Ward 2000; Ha et al. 2004; Kulinna & Cothran 2003; Kulinna, Cothran, & Regualos 2003; Kulinna & Silverman 1999; Kulinna, Silverman, & Keating 2000; Lund, Gurvitch, & Metzler 2008) was used to establish content validity of the questionnaire through the logical linking of the content and objectives of the study. Initially a panel of five physical education pedagogy experts were asked to review the descriptions of the three alternative teaching/coaching methods and the six statements related to a traditional, reproductive games session. All five experts were very familiar with the different teaching/coaching approaches and have had extensive school and university physical education teaching experience. Each expert was asked to review the descriptions and statements and provide feedback regarding wording and content appropriateness. Using this feedback the authors revised the content to reflect the experts' suggestions resulting in 100% agreement among the panel that all items adequately reflected the teaching approaches they were designed to represent and measure.

To ensure that the descriptions and statements were clearly structured and generated data were not limited by the participant's misinterpretation of key terminology, the items were then placed into a questionnaire and pilot tested with a group of final year PETE students not involved in the study. Students were asked to complete the questionnaire, review the content and specifically highlight any words that were unknown or confusing. Students reported some confusing terms leading to the modification of wording and the inclusion of descriptions of terminology. This process

along with the feedback received from the panel of five physical education pedagogy experts resulted in the creation of the final version of the questionnaire.

To determine if the items on the questionnaire could produce reliable scores in the population, Cronbach's alpha (α) coefficient was employed as a measure of the internal reliability. Reliability assessments showed a high level of inter item agreement among the six questionnaire items with a Cronbach alpha reliability coefficient of .84.

Participants

Participants were pre-service PETE students undertaking a compulsory unit on games teaching in 2010. Although students of varying ages and course progressions took the unit, only first year students who had finished school in Queensland within the last five years were chosen for the study, ensuring that this unit would be the student's first practical unit aimed at developing skills in teaching practice. The study sample (n=49) consisted of an approximately equal gender breakdown (53% male; 47% female) with a mean age (18.88 ± 1.57 years) representative of a typical PETE cohort at a university in Queensland. All participants in the sample had an extensive competitive games playing background and were grouped according to their self reported highest level of representation in games, either school/club (n=13), regional (Queensland consists of twelve regions, n=20), or state/national (n=16). To confirm accuracy of the researcher's classification of participants into groups, an independent expert also classified the participants and agreement was reached on 100% of sample. The participants also confirmed their satisfaction with their allocated grouping.

Data Generation

Pre-intervention

To address our aims, a mixed mode methodology consisting of both quantitative and qualitative research methods was used to generate a more comprehensive and accurate understanding of the perceptions and experiences of participants (Lomas & McLuskey 2005). Immediately prior to the first lecture of the unit, the study was described in the most general of terms to ensure no bias in responses and the mixed response questionnaire was administered by a third party, and completed individually and anonymously by all volunteer participants, then returned. Participants' qualitative responses, designed to further explore their quantitatively measured opinions on an effective games teaching session, provided us with the opportunity to corroborate the data and help ensure the accuracy of the collection techniques used (Carpenter & Suto 2008). This triangulation between different information sources was used to strengthen the study's credibility, validity and rigour and to provide a richness and depth of data (Denzin & Lincoln 2005).

Intervention: Games Based Learning in Physical Activity and Sport

Learning design and delivery of the unit via practical workshops and supporting lectures was informed by research evidence from contemporary thinking in pedagogy, motor learning and educational psychology, specifically, nonlinear pedagogy and self determination theory, a theory of human intrinsic motivation. Over an eight-week period, the unit was delivered to students via four two-hour lectures and eight four-hour practical workshops, where the students experienced the constraints led approach as learners and teachers. To help ensure consistency of delivery of the unit, tutors were provided with in-service training and booklets that documented the specific workshop

content to be covered and delivery method to be used for each session. Learning was contextualised in the practical workshop sessions where invasion, net/court and striking and fielding games were modified to present players with problem solving scenarios based on principles of game play. The tutors adopted a more ‘hands-off’ teaching style, acting as a learning facilitator and using strategies such as questioning and more natural implicit learning strategies (see Jackson & Farrow 2005; Renshaw et al. 2010) to guide learners through multiple opportunities to explore and work out solutions themselves in satisfying different task constraints. After experiencing the game, players were quizzed about their critical thinking and decision-making options during play. Students were also presented with game design problems and were challenged to solve them from a teacher’s perspective. At the end of each practical workshop session, students completed a reflection on their experiences and answered questions that required them to demonstrate understanding of how the motor learning theory had been applied in the workshop. Lectures provided theory and practical examples of how teachers and coaches might implement a nonlinear pedagogy into their practice as well as contrasting the approach with discussion of traditional, reproductive practice in physical education. The three innate, and psychological needs of self determination theory, competence, autonomy, and relatedness, were embedded into the design of the unit to intrinsically motivate student engagement thus increasing the opportunity for student appreciation, understanding and learning of the constraints led approach (Deci & Ryan 2002).

Post -intervention

In the last workshop session, students in the unit voluntarily completed the same mixed response questionnaire.

Data Analysis

Data from the first part of the questionnaire were summarised using descriptive statistics to identify the most frequently reported predominant games coaching and teaching approach experienced by the participants in each of the three groups, school/club, regional, and state/national. A chi-square test (using an α of .05) was then used to assess whether any variation existed among the three groups regarding the exposure to this teaching and coaching approach.

Pre and post games unit Likert Scale closed responses from the second part of the questionnaire were coded for analysis (Very Important = 5; Somewhat important = 4; Neither important nor unimportant = 3; Not very important = 2; Not at all important = 1) and the six response codes added together resulting in a traditional reproductive games teaching belief score for each respondent out of a possible score of 30. A one-way between groups analysis of variance (ANOVA) was used to investigate the impact that level of games playing success had on PETE students' pre and post intervention traditional games teaching belief scores and their degree of change in scores. Further analysis was done using Tukey's Honestly Significant Difference Post Hoc Test (using an α of .05) to determine which groups differed significantly from one another, pre and post intervention and in their degree of change. A two-tailed, paired samples *t* test with an α of .05 was used to compare the pre and post intervention traditional games teaching belief mean scores in each of the school/club, regional and state/national representative groups. Cohen's *d* was used to assess the size of the effect for each group.

Content analysis was used to analyse the qualitative open-ended questionnaire data to describe and interpret pattern (Morgan 1993). Codes were developed based on

data generated categories. The frequency of each code was analysed to detect patterns in the data. The patterns in the data were interpreted to produce an understanding of why and how these patterns occurred. The lead researcher and an experienced colleague completed this exercise independently and achieved 100% agreement on categories, and the detection and interpretation of patterns.

To corroborate the part two-questionnaire data, participants' quantitative responses (Likert Scale) were compared to content from their corresponding written qualitative responses for consistency. To ensure accuracy, a panel of three physical education pedagogy experts carried out this comparison task for each participant, resulting in matching occurring in over 98% of responses.

Results

Predominant games coaching and teaching approach that PETE recruits had been exposed to and influence on initial personal games teaching beliefs. The traditional, reproductive approach was the most frequently reported teaching approach used by the physical education teachers and sports coaches of participants in the state/national, regional and school/club groups (Table 1). The chi-square test indicated no significant differences among the 3 groups regarding the exposure to this traditional reproductive teaching and coaching approach for the percentages observed and expected based on the overall percentage of 87.8% (teaching) and 83.7% (coaching) expected for each subsection of the overall group (critical value CV= 3.84; School/club $w=0.1$ teaching; 0.1 coaching; Regional $w=0.1, 0.03$; State/national $w=0.001, 0.2$).

Table 1 inserted here

Participants in each representative level group held very strong custodial traditional physical education games teaching beliefs. The mean traditional reproductive

games teaching belief scores (/30) for each group were state/national representatives (M=24.25, SD =1.84, $p < .001$); regional representatives (M = 27.70, SD = 1.84, $p < .001$); school/club representatives (M=27.46, SD = 1.85, $p < .001$).

Variation in PETE recruits' acculturation and receptiveness to alternate pedagogy. The representative level of sport played prior to entry into PETE mediated participants' pre- and post- intervention belief in a traditional reproductive approach to teaching games and their receptiveness to an alternate pedagogy. The mean scores for each representative level group both pre- and post-intervention are presented in Figure 1. The one-way between-groups ANOVA was statistically significant, indicating that the PETE students' pre-intervention traditional reproductive games teaching beliefs, $F(2, 46) = 17.91, p = .001$, their post-intervention beliefs, $F(2, 46) = 9.85, p = .001$, and their change in beliefs, $F(2, 46) = 12.16, p = .001$, were all influenced by their level of games playing success.

Pre-Intervention. Post hoc analyses with Tukey's HSD revealed that the PETE students who were state/national representatives (M=24.25, SD =1.84, $p < .001$) had significantly lower traditional reproductive games teaching belief scores than school/club (M=27.46, SD = 1.85, $p < .001$) and regional representatives (M = 27.70, SD = 1.84, $p < .001$). No significant differences were found between school/club and regional representatives.

Post-Intervention. Post hoc analyses with Tukey's HSD revealed that the PETE students who were school/club representatives (M =13.77, SD = 5.89) had significantly lower traditional reproductive game teaching belief scores than regional (M = 20.55, SD =

3.59, $p < .001$) and state/national representatives ($M = 18.69$, $SD = 3.66$, $p < .001$). No significant differences were found between regional and state/national representatives.

Degree of Change in Belief Scores. Post hoc analyses with Tukey's HSD (using an α of .05) revealed that the school/club representatives ($M=13.69$, $SD = 5.84$) had a significantly greater change in their traditional reproductive games teaching belief scores than regional ($M = 7.15$, $SD = 3.92$, $p < .001$) and state/national representatives ($M = 5.56$, $SD = 4.40$, $p < .001$). No significant differences were found in traditional games teaching belief scores of regional and state/national representatives.

Pre and Post Intervention Differences. A two - tailed, paired-samples t-test revealed statistically significant differences between the pre and post games teaching belief mean scores for each group. In the school/club group, post intervention games belief mean scores ($M=13.77$, $SD=5.89$) were on average 13.69 points lower than their pre-intervention scores ($M=27.46$, $SD=1.85$), 95% CI [10.17, 17.22], $t(12) = 8.46$, $p = .001$. Cohen's d for this test was 3.54, which can be described as a very large effect. In the regional group, games belief mean scores ($M = 20.55$, $SD = 3.59$) were on average 7.15 points lower than their pre-intervention scores ($M=27.70$, $SD=1.84$), 95% CI [5.31, 8.99], $t(19) = 8.15$, $p = .001$. Cohen's $d = 2.64$, a very large effect. In the state/national group, post intervention games belief mean scores ($M=18.69$, $SD=3.66$) were on average 5.56 points lower than their pre-intervention scores ($M=24.25$, $SD=1.84$), 95% CI [3.22, 7.91], $t(15) = 5.06$, $p = .001$. Cohen's $d = 2.02$, a very large effect.

Figure 1 here

Interpretation of the patterns in participants' post-intervention questionnaire

qualitative responses indicated receptiveness to an alternate pedagogy. Pre-intervention, participants in all three representative level groups demonstrated very strong custodial traditional physical education games teaching beliefs by frequently using distinctively traditional reproductive reasoning when justifying their opinion of the importance of sub components of the traditional, reproductive skills- based approach for effective games teaching. For example, prior to participation in the games unit the most frequent category in participants' justification of their opinion of the importance of teaching students specific technical skills using drills before playing the game was that drills were important as they lay the foundation for the learning of technical skills required to play the game properly. This is reflected in the following individual participant response (participant 12): 'This [teaching technical skills using drills] is important to ensure the children are able to do the skills in the game properly'. Post-intervention, participants demonstrated their receptiveness to the constraints-led approach by frequently using theory distinctively linked to the alternate pedagogy when justifying their opinion about the importance of drills. After completion of the games unit the most frequent category identified in participant responses was that technical skills could be more effectively learned when performing in "real" representative game situations such as small-sided or modified games not isolated drills. This is reflected in the following individual participant responses (participants 37; 41): 'These technical skills need to be embedded into a representative game, to let the students explore the skills'; 'In a drill markers don't move and the player has no pressure or unpredictable actions of other players to deal with unlike a game'.

Prior to participation in the games unit the most frequent category was identified in participants' responses justifying their opinion of the importance of a visual demonstration and verbal instruction of the desired 'ideal' model for effective games

teaching. Visual demonstrations and verbal instructions were considered an important component of teaching as they show students the required execution of the correct technique. This is reflected in the following individual participant response (participant 49): '[demonstrations with verbal instructions] allow students to see and understand the technique correctly and gives them something to follow'. After completion of the games unit the most frequent category identified in participant responses was that there is no correct 'ideal' technique; therefore students should be allowed to explore their own solutions for themselves. This is reflected in the following individual participant response (participant 22): 'There is no "perfect" way of doing a skill, every player is different and will find their own solutions to problems'.

Discussion

The principal aim of this study was to investigate whether past school and sporting experiences are powerful influences on Queensland PETE recruits' perspectives and initial personal beliefs about effective physical education teaching practice and their receptiveness to an alternative pedagogical approach. In line with Lawson's (1983a, 1983b) model of physical education teacher socialisation we expected that QLD PETE recruits would hold strong custodial, traditional reproductive physical education games teaching beliefs. We also expected that performance level of sport played prior to entry into PETE would mediate their receptiveness to innovation, with those playing at higher representative levels being more resistant when presented with a new pedagogical approach.

Predominant games coaching and teaching approach PETE recruits exposed to and influence on initial personal games teaching beliefs. The traditional, reproductive

approach was the most frequently reported approach experienced by QLDPETE recruits when being taught physical education (90%) and coached in sport (84%). This finding is consistent with the results of previous studies of teaching styles used by Queensland physical education teachers (Cothran et al. 2005; Sue See & Edwards 2010) providing more evidence regarding how Australian high school students are taught physical education. The findings are also consistent with the results of a previous study that also used PETE students' reported memories to identify physical education teaching styles (Cothran et al. 2000).

As predicted, exposure to a traditional, reproductive approach appears to have had a very powerful influence on QLD PETE recruits as they possessed very strong custodial, traditional, reproductive physical education games teaching beliefs. These recruits strongly believed in the importance of a general warm up, a visual demonstration of the 'ideal' performance model, the teaching of skills using repetitive, isolated drills before the game is played, and the use of corrective verbal feedback. These results are consistent with Lawson's (1983a, 1983b) physical education socialisation theory of acculturation that past school and sporting experiences are powerful in influencing PETE recruits' perspectives and initial personal beliefs about effective physical education teaching practice. They also confirm our predictions about the incompatibility of QUT PETE recruits beliefs regarding effective games teaching practice with the Queensland Senior Physical Education syllabus requirement of developing intelligent performers, highlighting the need to introduce students at QUT to alternate pedagogical approaches to teaching games.

When considering the PETE recruits' biographies, all three groups had strong initial traditional games teaching beliefs, however, the state/national group displayed significantly lower scores than the school/club and regional groups. This is surprising as

it would have been expected that state/national recruits would have a stronger affiliation with this approach than the other 2 groups as their greater success could personally be attributed to it. A potential explanation could be that state/national players are more likely to come into contact with more coaches, thus increasing the possibility of being exposed to alternate coaching methods, despite an overall predominance of being taught in a traditional way.

Variation in PETE recruits' acculturation and receptiveness to alternate pedagogy. Experiences of participation in the alternate games teaching unit had a significant impact on PETE students' personal beliefs about effective physical education games teaching practice. Prior to participation in the games unit all three groups of PETE students' possessed very strong custodial, traditional, reproductive physical education games teaching beliefs. After participation, there was a significant, meaningful change in beliefs in all 3 groups of PETE students', regardless of their previous level of games playing success. After experiencing the games unit, participants placed significantly less importance on the sub components of a traditional reproductive teaching session, and when justifying their reasoning demonstrated receptiveness to the productive student centred constraints led teaching approach presented in the unit.

Consistent with Lawson's (1983a, 1983b) physical education socialisation theory, and research by Sofu & Curtner-Smith (2005, 2010), and Stran & Curtner-Smith (2009b) we found that PETE recruits' acculturation, in this study level of games playing success, did mediate the degree of receptiveness to the alternative pedagogical approach. PETE students with a background of limited achievement in competitive sports, that is, the highest level represented was their school or club, were significantly

more receptive to the constraints led approach, than those students with a background of moderate (regional) and high (state/national) achievement. However, contrary to our expectations and Lawson's physical education socialisation theory (1983a, 1983b) highly successful products of the traditional, reproductive approach significantly changed their custodial beliefs in this approach.

The results of this present study advance our understanding of professional socialisation, acculturation and receptiveness to alternate pedagogy and show that, contrary to previous research undertaken in North America, in Australia, it is possible for PETE educators to change beliefs in order to overcome the constraint of acculturation and provide PETE students with the knowledge, understanding and belief in an alternate approach to teaching games in physical education. In this study PETE students, regardless of level of previous sporting success, developed a belief in the constraints led approach as a viable and realistic alternative to a traditional reproductive approach to teaching games. A belief in an alternate pedagogy is an important starting point in changing educational practice as beliefs are major determinants of change in the use of teaching styles (Ernest 1989; Pajares 1992; Ennis 1994; Borko & Putnam 1996; Butler 2005). This change in belief is an encouraging first step for teacher educators who wish to influence future teaching practice so that it is better aligned with curriculum document objectives and is based on sound pedagogical evidence for their practice.

There are some potential reasons that can be used to explain the success of this programme in reducing the influences of acculturation and impacting PETE students' physical education teaching beliefs. The significant changes in beliefs support the efficacy of the learning design and delivery of the unit within a research-informed pedagogical framework. The presentation and integration of motor learning theory and

practice; an emphasis on students experiencing the alternate approach as learners; and the challenging of custodial beliefs through critical reflection of traditional and alternate teaching approaches all appeared to interact to influence beliefs of the PETE students (Lawson 1988; Rink 2001; Light 2008; Deenihan, McPhail & Young 2011). Previous authors have also credited their pedagogical frameworks for playing a significant part in a positive change in pre-service teachers' attitudes towards alternate games pedagogy (Jenkins 2004; Light & Georgakis 2005). Results of our study also support the efficacy of the model for effective PETE programmes described by Lawson (1983a, 1983b). The PETE tutors who took classes in this study agreed on a professional ideology and what Lortie (1975) called a "shared technical culture" (i.e. the knowledge and skills required for physical education teaching). They demonstrated an innovative orientation towards physical education by employing the constraints-led approach in their own teaching and coaching practice. Lawson's model is also recognised as a key component in many successful recruit induction studies (Sofa & Curtner-Smith 2005, 2010; Stran & Curtner-Smith 2009b; Curtner-Smith 1997a, 1997b, 1998). Exposure to the alternate pedagogy clearly had an impact on changing students' beliefs about how physical education should be taught. The emphasis on inclusion and the individual learner characteristic of the constraints-led approach may have been inherently attractive to many PETE students. However, at this stage, the specific reasons for this change remain unclear and need further investigation.

There are, however, a number of candidate reasons for this change in thinking. As highlighted by Renshaw et al (2010), the principles of nonlinear pedagogy based on motor learning theory have great potential within physical education as it can substantially underpin practice in the field. However, such advances in knowledge about the processes involved in the acquisition of movement skills have not previously been

identified by physical education specialists and rarely applied in pedagogical practice. Metzler (2000) and Rink (1999) have argued that pedagogical strategies should be based on learning theory to achieve intended learning outcomes. The constraints-led approach may have appealed to PETE students as the motor learning theory underpinning the approach provided them with a convincing theoretical framework for facilitating learning design in the development of intelligent, thinking performers. Light (2008) suggests that this understanding of how the learner learns is a particularly important catalyst for change when an alternate pedagogy challenges the beliefs about learning that PTs hold. The games based model (see Chow et al. 2009 to demonstrate how a constraint-led approach can underpin games design in TGfU) may also have attracted PETE students because the constraint led approach is somewhat compatible with their sporting background as (mainly) team games players (Curtner-Smith & Sofo 2004; Hastie, Curtner-Smith, & Kinchin 2005). An alternative explanation could be that the way that the unit was delivered led to positive affect for the participants, as the programme design embedded self determination theory into the design of the learning experiences in attempts to enhance intrinsic motivation (Deci & Ryan 2002). All students were afforded the opportunity to be included in all activities and to be successful as games were played that allowed them to manipulate constraints to match their own ability level. Students also worked as part of a team for the entire duration of the unit (in games and when completing accompanying written tasks), allowing them the opportunity to connect with others in the group and creating a supportive environment that facilitated a sense of relatedness and positive experiences for individuals, particularly those who were not confident in their ability. Light and Butler (2005) have suggested that the PTs in their study had a personal and affective dimension to their belief in TGfU, and it appealed to them due to the social relationships and

interaction fostered between learners and between learners and the teacher. The approach adopted in this unit, may have had a similar effect. For example, the use of a more hands-off teaching approach and more natural implicit learning strategies (see Jackson & Farrow 2005) may be particularly attractive for females and the less confident males, for example, who tend to be marginalised and excluded by emphasis on the mastery of technique through isolated drills (Ennis 1999). However, in a cohort that consists of specialist physical education PTs, the success of the programme might also have been influenced due to the fact that the majority of the PETE tutors who delivered the unit were confident, enthusiastic, experienced and successful practicing physical education teachers with the ability to influence the PTs during the unit (Graber 1995).

Although researchers (Light & Butler 2005; Jenkins, 2004) have explored the unit experiences that have influenced PT's receptiveness to an alternate pedagogy, other authors have suggested that future research is needed that takes this a step further by investigating how PT's acculturation influences their reactions and learning during professional preparation (Sofa & Curtner Smith 2005). This study has provided preliminary evidence of variations in acculturation and receptiveness to an alternate pedagogy, however; further qualitative research data using interviews to explore these issues in greater depth would strengthen our findings. Further research is also needed to explore how the specific games unit learning experiences interacted with the PETE students' acculturation and existing games teaching beliefs to influence their receptiveness to an alternate pedagogy.

In conclusion, while the findings in this study are promising and indicate that, despite the relatively brief exposure to the constraints led approach, PETE students developed a belief in an alternate approach to the traditional reproductive approach so

widely used in Queensland schools, these results in no way suggest that PETE students will necessarily be successful in taking the constraints led approach into their practical teaching experiences. However, while the majority of the participants had limited or no teaching experience, many expressed confidence and enthusiasm to try the constraints led approach when teaching as typified by the comment below taken from a student's individual reflection at the end of the unit (not included in the study):

“As a student who was always taught physical education in the “old military style” of teaching, I was so grateful to hear there was an alternative but had no idea that the alternative could be so rewarding, so fun and it works! I cannot wait to share my experiences with other students, other teachers and hopefully use it on my prac at the beginning of next year.” (Susan).

This is an encouraging comment for teacher education programmes and supports the need for further research to move the area forward.

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Table 1: PETE students self reported description of the predominant method used by their physical education teacher and coach by level of games playing success

PETE students self reported description of the predominant teaching and coaching method used by their physical education teacher and coach	State/National (N=16)		Regional (N=20)		School/club (N=13)	
	How Taught	How coached	How Taught	How coached	How Taught	How coached
A. Traditional, Reproductive Approach Warm up; Demonstration of ‘ideal model’ of technical skill; Practice of demonstrated model in repetitive isolated drills (i.e. tasks that are separate from the game and made easier by taking away key aspects of the actual game such as defenders); Corrective verbal feedback regularly provided by the teacher/coach (i.e. information you receive about your actions compared to a desired, “ideal” movement response); Application of technical skill in a small sided game (e.g. 3vs3) and/or the actual full game .	14 (88)	15 (94)	19 (95)	16 (80)	11 (85)	10 (77)
B. Game Sense Approach Playing of small sided/modified games (i.e. modified scoring, playing dimensions, equipment, rules) that replicate competitive performance environments including defenders; Teacher/coach uses questioning to encourage players to reflect and make own decisions to solve problems; Playing of the actual full game (no isolated drills, ideal demonstration, corrective feedback)	1 (6)	1 (6)	1 (5)	4 (20)	0 (0)	3 (23)
C. Non Teaching Approach Playing of small-sided games and/or the actual full game with predominantly no teaching/coaching . Teacher/coach simply supervises or referees.	1 (6)	0 (0)	0 (0)	0 (0)	2 (15)	0 (0)

Note: Figures in parentheses are percentages

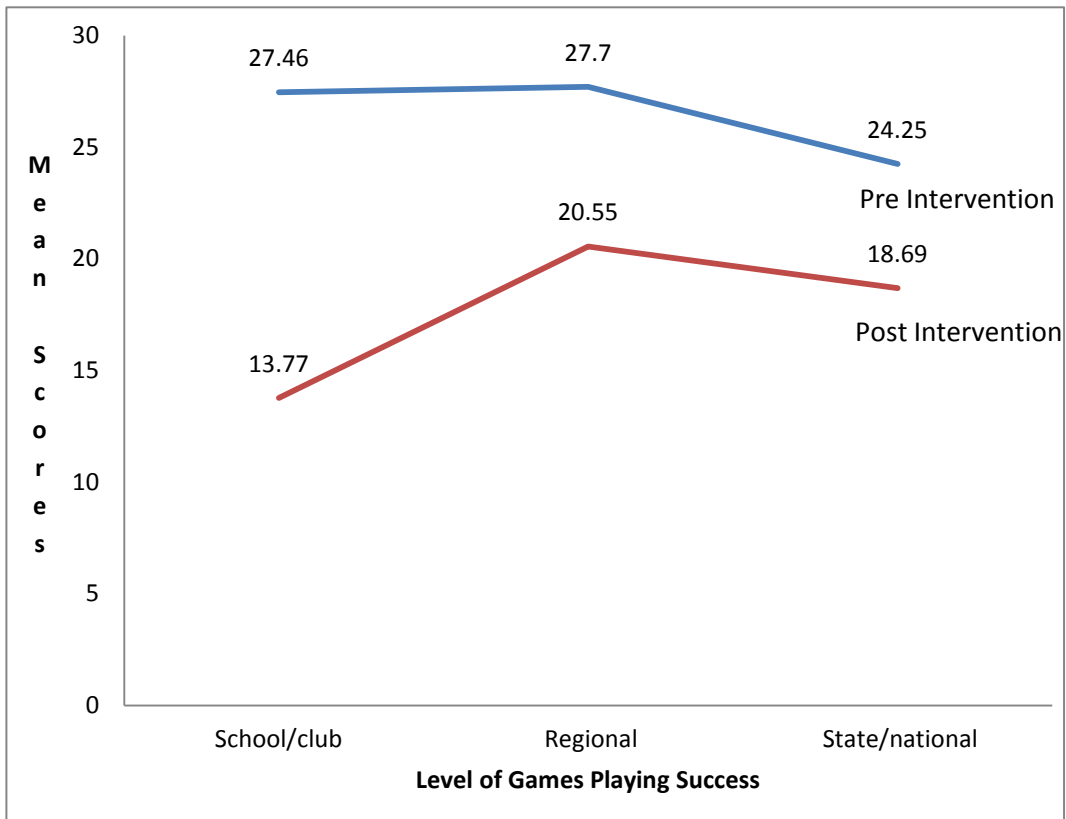


Figure 1: Mean traditional games teaching belief scores for each group pre and post intervention