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SECONDARY PGCE PE STUDENTS' PERCEPTIONS OF THEIR SUBJECT KNOWLEDGE

by

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Abstract

PE teachers in England are required to teach a wide range of physical activities in order to fulfil the requirements of the National Curriculum for Physical Education (NCPE). The content or subject knowledge necessary to teach all areas of activity in the NCPE is acknowledged as important, both in its own right and as giving students confidence and accuracy for subject application. Subject knowledge is identified as one of the standards for the award of qualified teacher status on completion of an initial teacher education course in England. However, students entering secondary Post-Graduate Certificate in Education (PGCE) PE courses bring with them a variety of experiences, qualifications and subject knowledge to teach the areas of activity in the NCPE. Most students have a sports-related degree. However, such degrees may not include subject knowledge appropriate to teach all six areas of activity in the NCPE. Students, therefore, are required to gain subject knowledge on their one year PGCE course. The purpose of this study was to look at secondary PGCE PE students' perceptions of amount of subject knowledge in the six areas of activity that comprise the NCPE.

Twenty-seven students completed a questionnaire at the beginning of each of the second and third terms of their course (January and April). The questionnaire included a question about knowledge in the six areas of activity in the NCPE and in specific Games taught in many schools in England. Results suggested that there were differences in students' perceptions of amount of subject knowledge. The highest percentage of students perceived good subject knowledge in traditional team Games. The highest percentage of students perceived little subject knowledge in Outdoor and Adventurous Activities (OAA) and Dance. There were significant differences between male and female students' perceptions of knowledge in OAA, Swimming, Football, Netball and Rounders. There were also significant differences in students' perceptions of knowledge in Dance, Gymnastics, OAA and Volleyball between the beginning of the second and third terms.

Implications of the results are considered in relation to: (i) experiences which students require on PGCE courses to develop subject knowledge; (ii) selection procedures for secondary PGCE PE courses; and (iii) preparation of students for secondary PGCE PE courses on sports-related degree courses.

Introduction

Requirements of the National Curriculum for Physical Education (NCPE)

PE teachers in England are required to teach a wide range of physical activities in order to fulfil the requirements of the NCPE. The NCPE comprises six areas of activity: Athletic Activities; Dance; Games; Gymnastic Activities; Outdoor and Adventurous Activities (OAA); and Swimming. The NCPE was introduced in 1992 (DES, 1992). In the secondary age phase, Key Stage 3 (KS3) pupils (aged 11-14, school years 7-9) were to pursue the programmes of study for a minimum of four areas of activity and Key Stage 4 (KS4) pupils (aged 14-16,

school years 10 and 11) were to pursue at least two activities, which might be drawn from the same area of activity or from two different areas. In 1995 the NCPE was modified (DFE, 1995). KS3 pupils should be taught Games, at least one other full area of activity and at least two additional half areas of activity, taken from different areas of activity. At least one half area of activity must be either Dance or Gymnastic Activities. Games should be taught in each year of the Key Stage. KS4 pupils should be taught a minimum of two different activities. At least one of the two activities should be a Game.

Subject knowledge as a standard for the award of qualified teacher status (QTS)

Carter, Carre and Bennett (1993) suggested that 'in order to improve teaching, teacher thinking and subject knowledge are deemed to be important ingredients' (p.89). Subject knowledge is identified as one of the four standards for gaining QTS on completion of an initial teacher education (ITE) course in England; the four standards being: (i) knowledge and understanding; (ii) planning, teaching and class management; (iii) monitoring, assessment, recording, reporting and accountability; (iv) other professional requirements. For example, the standards for knowledge and understanding include the requirement that 'Those to be awarded Qualified Teacher Status must, when assessed, demonstrate that they: have a secure knowledge and understanding of the concepts and skills in their specialist subject(s) at a standard equivalent to degree level to enable them to teach it (them) confidently and accurately in KS3 and KS4 and, where relevant, post-16' (DfEE, 1998, p.9).

Subject knowledge and subject application

But, what is meant by subject knowledge? These standards and the more general 'competences' (DFE, 1992) which they replaced identify subject knowledge separately from subject application. Differentiation between subject knowledge and subject application has been identified by other authors. The work of Schulman (1986) is the basis for much of the work on differentiation between the two. He used the terms "subject matter content knowledge" and "pedagogical content knowledge". Subject matter content knowledge was described as 'the amount and organisation of knowledge per se in the mind of the teacher To think properly about content knowledge requires going beyond knowledge of the facts or concepts of a domain. It requires understanding of the structures of the subject matter', with the teacher needing 'not only to understand *that* something is so; the teacher must further understand *why* it is so, on what grounds its warrant can be asserted, and under what circumstances our beliefs in its justification can be weakened and even denied' (p.9).

Schulman (1986) described pedagogical content knowledge as knowledge that 'goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge *for teaching*' ... 'the particular form of content knowledge that embodies the aspects of content most germane to its teachability', in which he included 'the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations and demonstrations - in a word, the ways of representing and formulating the subject that make it comprehensible to others an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons' (p.9). Cochran, De Ruiter and King (1993) described pedagogical content knowledge as that which 'differentiates expert teachers in a subject area from subject area experts. Pedagogical content knowledge concerns the manner in which teachers relate their subject matter knowledge (what they know about what they teach) to their pedagogical content (what they know about teaching) and how subject matter knowledge is a part of the process of pedagogical reasoning' (p.263).

The relationship between subject knowledge and subject application

These quotations begin to identify the importance of subject matter content knowledge (subject knowledge) to pedagogical content knowledge (subject application)¹ and the relationship between the two. DfEE (1998) further clarified this relationship when they suggested that secure knowledge and understanding enables students to teach their subject confidently and accurately. By implication, this suggests that less secure subject knowledge may result in less confidence and less accuracy in teaching.

Despite the importance of and relationship between subject knowledge and subject application, it is difficult to ensure that all entrants to a one-year secondary Post-Graduate Certificate in Education (PGCE) PE course have secure knowledge to teach the six areas of activity in the NCPE. Some entrants have knowledge in a number of activities in a number of areas of activity in the NCPE, whilst others have knowledge in one or two activities in a few areas of activity.

Students' prior experiences, qualifications and subject knowledge

When students enter an ITE PE course they bring with them a variety of personal experiences (e.g. playing, coaching, teaching), qualifications (e.g. National Governing Body coaching awards, umpiring/refereeing awards) and subject knowledge (e.g. from secondary school and higher education experiences) of the six areas of activity in the NCPE. One of the major routes into secondary PE teaching in England is a one year PGCE course. One of the requirements for students entering a PGCE course is a degree or a qualification recognised to be equivalent to a degree. More specifically, the content of the entrants' previous education should provide 'the necessary foundation for work as a teacher in the phase(s) and subject(s) that they are to teach' (DfEE, 1998, p.135). The degree generally recognised as meeting this requirement for students entering a secondary PGCE PE course is a sports-related degree (e.g. sports studies, sports science, sport and leisure). Although degrees in other subjects may provide the necessary foundation for work as a secondary PE teacher (e.g. psychology), the link is less obvious. Thus, evidence of a strong sporting/physical activity profile must be provided by such applicants to prove their suitability for entry to a PGCE PE course. The combination of experience, qualifications and subject knowledge provided by such applicants may result in them being as strong, or stronger, applicants overall than those who have followed a sports-related degree. However, the majority of entrants to PGCE courses have a sports-related degree. For example, during the 1997-1998 academic year, 88% of students who entered one secondary PGCE PE course in England had a sports-related degree. In 1998-1999 all students had a sports-related degree.

Sports-related degrees are wide ranging. They comprise, for example, single honours degrees in sports science, sports studies, sports and fitness science, sport and leisure studies/management and also sport science/studies with one or two other subjects (e.g. sports science and business studies). Her Majesty's Inspectors (HMI) (HEI, 1998), indicated that 'Most postgraduates have first degrees whose content has a limited relationship to physical education in the National Curriculum' (p.1). Most sports-related degrees have focused on theoretical sub-disciplines such as biomechanics, physiology, psychology and sociology of sport. In many sports-related degrees there is limited practical content. Furthermore, any practical component offered in sports-related degrees may not necessarily include practical activities that are relevant to the NCPE.

In a study in 1995 of the content of 42 sports-related degrees, as described in the prospectus sent by each institution to potential students, Capel found that 32 (76%) of the courses

¹ Throughout the rest of this paper the terms subject knowledge and subject application are used rather than subject matter content knowledge and pedagogical content knowledge, respectively.

identified practical work in their course description; five (12%) included practical work in year one only and 27 (64%) included practical work in all three years. Four prospectuses stated explicitly that practical sports performance was not included on the course. It is not clear whether practical work was included in the other six courses. One prospectus indicated that the practical work on the course focused mainly on Dance and two mainly on outdoor pursuits. The content of the practical work on the other courses was not clear in the prospectus; nor was it clear how much practical work was included on any of the courses or whether this was compulsory or optional. Teaching was mentioned specifically as a career option for 24 (57%) of the courses.

Reporting the outcomes of a conference to look at the National Curriculum and ITE in PE, Reeves (1993) suggested that, 'subject knowledge from first degrees cannot be taken for granted. Even when students have appropriate subject knowledge there remains the problem of personal practical application (practical competence)' (p.54).

Students' experiences and knowledge in Games

The practical subject knowledge with which students enter a secondary PGCE PE course may, therefore, be that which they have brought from their personal experiences of sports and physical activities at school and outside school, e.g. playing, attending National Governing Body coaching award courses, coaching or organising sports and physical activities in a school PE department and/or in youth clubs, working with young people in summer camps or play schemes or working in a fitness or leisure centre. Students' personal experiences, qualifications and knowledge in sports and/or physical activities are wide ranging, although the majority have most experience in one or a number of games. They include participating in Games such as Football, Hockey, Netball, Rugby, Basketball, Cricket, Rounders and/or Tennis.

One reason for this heavy bias towards Games by applicants to, and students accepted onto, secondary PGCE PE courses could be the dominance of Games in many school PE curriculum, both before and after the introduction of the NCPE. For example, Fairclough and Stratton (1997) compared data from surveys between 1974 and 1997 to assess changes in the time and content of PE curricular and extra-curricular activities. Results showed that in 1997 Games received the largest amount of curriculum time throughout KS3 and KS4, followed by Athletics and then Gymnastics. Traditional Games such as Football, Netball, Basketball, Hockey, Rugby, Cricket and Rounders dominated the curriculum throughout years 7 to 11, whilst Dance and Swimming were less prominent. The number of schools offering Dance and Gymnastics dropped dramatically at KS4. Only one third of schools delivered courses with a focus on Health-Related Exercise (HRE) each term. These findings were consistent with those of Penney and Evans (1994) and OFSTED (1995b) who reported between 50% and 70% of curriculum time in PE at KS3 was spent on Games.

The findings of OFSTED inspections of 29 secondary ITE courses in England conducted between 1996 and 1998 also highlighted this imbalance. HMI (HEI, 1998) reported that in relation to secondary PGCE PE students' subject knowledge and understanding, 'commonly strengths relate to Games playing in its different forms, or to the study of theoretical aspects such as physiology or biomechanics, which should be of some use in their teaching'. ... However, 'too many (students) are insecure in their experience, knowledge and understanding of some of the six areas of the National Curriculum' (p.7). Thus, subject knowledge needs to be developed across all areas of activity in the NCPE over the course of the PGCE year, alongside the ability to apply the subject knowledge and other standards required of newly qualified teachers (NQTs).

The role of higher education institutions (HEIs) and schools in developing students' subject knowledge

Although the development of subject knowledge is, to a large extent, the responsibility of the student, HEI tutors and school-based subject mentors have a role to play in providing learning opportunities and experiences to help students to develop subject knowledge. Traditionally, subject knowledge has been developed in the HEI based part of the course, with schools concentrating on the application of that knowledge. The development of subject knowledge on a one year (36 week) PGCE course has always been acknowledged as difficult. However, the change to school-based ITE in England in 1992 may have made this more difficult. On a one year school-based PGCE course students spend 120 of 180 days (or two-thirds of their time) in schools. Much less time is available in the HEI to develop subject knowledge across the areas of activity in the NCPE. School subject mentors must take greater responsibility for helping students to develop their subject knowledge across the areas of activity in the NCPE as well as the ability to apply that subject knowledge to the teaching situation. This may be difficult to achieve as there is limited time in a school day and schools may not teach the full range of activities in the NCPE whilst students are in the school.

With this background it is not surprising that subject knowledge has been identified as a concern for students in studies of students' concerns (e.g. Coulter, 1987; Hardy, 1995; Laker and Jones, 1998; Mawer, 1995). For example, Laker and Jones (1998) found that there was a major concern by students' about subject knowledge and Hardy (1996) suggested that students' lack of knowledge in areas of activity in the NCPE was a constant concern throughout the PGCE year. He also suggested that it was not surprising that students felt vulnerable when planning for the range of NCPE activities as less time was spent on practical activities in the PGCE year and on students' degree courses (as identified above).

Purpose of the study

In order to address these concerns, students need to develop secure subject knowledge in all areas of activity in the NCPE so that they may teach them confidently and accurately at KS3 and KS4. To date, there has been little research into students' subject knowledge across the areas of activity in the NCPE. The purpose of this study was, therefore, to look at students' perceptions of amount of subject knowledge in the six areas of activity in the NCPE.

Methods

Subjects

The sample comprised 27 students (16 (59%) male and 11 (41%) female) on a one year secondary PGCE PE course at one HEI in England. These students completed a questionnaire twice during the year: first, at the beginning of the second term of their course, in January, after they had completed a seven week serial school experience followed by a four week block experience, and prior to starting their second school experience; and second, at the beginning of the third term of their course, in April, almost half way through their final block school experience, but before the main block of teaching summer activities, e.g. Athletics, OAA, Cricket, Rounders, Tennis. Twenty six of the 27 students completed the questionnaire on both occasions that it was administered.

Detailed background information on students was collected at the beginning of the course. This showed diversity among the students on a number of variables. The ages of the students ranged from 21 to 32 years, with a mean age of 23.8 years. Eighty-eight percent of the students had gained a sports-related degree, 67% of them having studied sport and one other subject. Most students' subject knowledge from their degree courses was dominated by Games (included in 96% of degree courses followed by these students) and HRE (experienced by all students in this study in their degree course). In relation to the other areas of activity 22 (81%) students indicated that they had previous experience of Swimming; 17

(63%) of Athletics; 15 (55%) of OAA; 8 (30%) of Gymnastics; and 6 (22%) of Dance. Prior to entry to the course, students had attended and successfully completed National Governing Body award courses, mainly in Games, but also in other areas of activity: OAA and Netball (both 30%), Swimming, Basketball and Hockey (all 26%), Rugby (22%), Football (15%) and Tennis (15%), Dance and Gymnastics (both 7%) and Athletics (4%). Fifteen percent of the students had studied GCSE PE and 11% had studied A Level PE. All students had previous experience of working with children, e.g. coaching, working in summer camps or play schemes. Some had extensive work with children, whereas the experience of others was limited.

The course

The 36 week PGCE course being followed by these students was for the 11-18 age range. Twenty four weeks of the course were spent in school and 12 weeks in the HEI. After a three week induction period in the HEI, students spent two days per week in school and three days in the HEI, for seven weeks. This serial experience was followed by a block experience of four weeks. In the first half of the second term (6 weeks), four days per week were spent in a different type of school, with one day per week in the HEI. This was followed by a twelve-week school experience, spanning the second and third terms. The final three weeks of the course were spent in the HEI preparing students for work as a NQT.

The course is organised in partnership with approximately 27 schools. There are many different types of schools in the partnership. They include high schools, comprehensive schools, technology schools, secondary modern schools, grammar schools and independent schools. Schools are grouped into 13 geographic consortia. During the year students are placed in two schools in one of the 13 consortia. To support students in school, there are specially trained school subject and professional mentors, as well as HEI subject and professional tutors.

All partnership schools in which these students were placed were meeting the requirements of the NCPE. Generally, schools were following four of the six areas of activity comprising the NCPE, although arrangements were made so that students were able to teach all six areas of activity. The areas of activity most commonly taught in the schools were Athletic Activities, Dance, Games and Gymnastic Activities. The Games which were most commonly taught in the partnership schools included Badminton, Basketball, Cricket, Football, Hockey, Netball, Rugby and Tennis.

Instruments

This study was part of a larger study looking at the perceptions of partners in secondary PGCE partnership schemes in England. As part of this larger study students completed a questionnaire which comprised a number of questions. One of the questions asked students to record their perceptions of amount of subject knowledge in the six areas of activity in the NCPE and in specific Games taught in many schools in England. The question was answered on a five point scale on which: 1 = very good knowledge; 2 = good knowledge; 3 = can get by; 4 = a little knowledge; 5 = no knowledge.

Analysis

Numbers and percentages were calculated for each activity identified in the question. Students perceived subject knowledge was recorded as “good knowledge”, which includes answers recorded as either 1 or 2 on the scale and “little knowledge”, which includes answers recorded as 4 or 5 on the scale. T-tests were conducted to determine if there were any significant differences between male and female students on each activity at the beginning of both the second and third terms. T-tests were also conducted for each activity to determine if there was any significant difference between the results at the beginning of each of the second and third terms.

Results

Students' perceptions of amount of subject knowledge at the beginning of the second term

As Table 1 shows, at the beginning of the second term of their course, students' perceptions of amount of subject knowledge varied between activities. The activities identified by the highest percentage of all students as those in which they perceived good knowledge were Football and Rounders (54% each), followed by Hockey (53%) and Basketball (50%).

Table 1: Amount of subject knowledge perceived by all students in the six areas of activity comprising the NCPE

Activity	Very good knowledge		Good knowledge		Can get by		Little knowledge		No knowledge	
	n	%	n	%	N	%	n	%	n	%
Athletics										
2nd term	3	12%	7	27%	12	46%	3	12%	1	4%
3rd term	2	8%	9	35%	10	38%	4	15%	1	4%
Dance										
2nd term	0	0%	3	12%	8	31%	11	42%	4	15%
3rd term	0	0%	10	38.5%	6	23%	10	38.5%	0	0%
Gymnastics										
2nd term	1	4%	5	19%	12	46%	7	27%	1	4%
3rd term	2	8%	10	38%	13	50%	1	4%	0	0%
OAA										
2nd term	0	0%	7	27%	6	23%	10	38%	3	12%
3rd term	1	4%	7	27%	12	46%	5	19%	1	4%
Swimming										
2nd term	4	15%	8	31%	4	15%	8	31%	2	8%
3rd term	4	15%	7	27%	10	39%	5	19%	0	0%
Games										
Badminton										
2nd term	4	15%	7	27%	9	35%	3	12%	3	12%
3rd term	2	8%	13	50%	8	31%	3	11%	0	0%
Basketball										
2nd term	4	15%	9	35%	11	42%	1	4%	1	4%
3rd term	4	15%	16	62%	4	15%	1	4%	1	4%
Cricket										
2nd term	1	4%	4	15%	9	35%	10	38%	2	8%
3rd term	1	4%	6	23%	10	38%	8	31%	1	4%
Football										
2nd term	6	23%	8	31%	4	15%	5	19%	3	12%
3rd term	8	31%	7	27%	6	23%	3	11%	2	8%
Hockey										
2nd term	4	15%	10	38%	9	35%	2	8%	1	4%
3rd term	5	19%	13	50%	4	15%	2	8%	2	8%
Netball										
2nd term	3	12%	9	36%	3	12%	5	20%	5	20%
3rd term	5	19%	6	23%	7	27%	7	27%	1	4%
Rounders										
2nd term	3	12%	11	42%	9	35%	3	12%	0	0%
3rd term	2	8%	10	38.5%	10	38.5%	4	15%	0	0%
Rugby										
2nd term	5	19%	3	12%	8	31%	6	23%	4	15%

3rd term	4	15%	10	38%	6	24%	4	15%	2	8%
Tennis										
2nd term	3	11%	7	27%	11	42%	5	20%	0	0%
3rd term	3	12%	9	35%	8	31%	4	15%	2	8%
Volleyball										
2nd term	2	8%	12	46%	8	31%	3	11%	1	4%
3rd term	3	12%	7	27%	10	38%	6	23%	0	0%

As Table 2 illustrates, the activities identified by the highest percentage of male students as those in which they perceived good knowledge were Football (80%), followed by Badminton and Basketball (53% each), Athletics (47%) and Hockey (46%). As Table 3 shows, the activities identified by the highest percentage of female students as those in which they perceived good knowledge were Netball (100%), Rounders (82%), Hockey and Swimming (63% each).

Table 2: Amount of subject knowledge perceived by male students in the six areas of activity comprising the NCPE

Activity	Very good knowledge		Good knowledge		Can get by		Little knowledge		No knowledge	
	n	%	n	%	N	%	n	%	n	%
Athletics										
2nd term	3	20%	4	27%	8	53%	0	0%	0	0%
3rd term	2	13%	5	33%	7	47%	1	7%	0	0%
Dance										
2nd term	0	0%	1	7%	5	33%	6	40%	3	20%
3rd term	0	0%	4	27%	5	33%	6	40%	0	0%
Gymnastics										
2nd term	0	0%	4	27%	7	47%	4	27%	0	0%
3rd term	0	0%	4	27%	11	73%	0	0%	0	0%
OAA										
2nd term	0	0%	4	27%	4	27%	6	40%	1	7%
3rd term	1	7%	4	27%	8	53%	2	13%	0	0%
Swimming										
2nd term	1	7%	4	27%	2	13%	6	40%	2	13%
3rd term	1	7%	4	27%	6	40%	4	27%	0	0%
Games										
Badminton										
2nd term	3	20%	5	33%	3	20%	2	13%	2	13%
3rd term	2	13%	6	40%	5	33%	2	13%	0	0%
Basketball										
2nd term	3	20%	5	33%	5	33%	1	7%	1	7%
3rd term	3	20%	8	53%	2	13%	1	7%	1	7%
Cricket										
2nd term	1	7%	4	27%	5	33%	4	27%	1	7%
3rd term	1	7%	5	36%	5	36%	3	21%	0	0%
Football										
2nd term	6	40%	6	40%	0	0%	2	13%	1	7%
3rd term	7	47%	5	33%	2	13%	1	7%	0	0%
Hockey										
2nd term	2	13%	5	33%	6	40%	2	13%	0	0%
3rd term	2	13%	7	47%	3	20%	1	7%	2	13%

Netball										
2nd term	0	0%	1	7%	3	21%	5	36%	5	36%
3rd term	1	7%	1	7%	6	40%	6	40%	1	7%
Rounders										
2nd term	1	7%	4	27%	7	47%	3	20%	0	0%
3rd term	0	0%	6	40%	6	40%	3	20%	0	0%
Rugby										
2nd term	3	20%	2	13%	5	33%	4	27%	1	7%
3rd term	3	20%	6	40%	3	20%	3	20%	0	0%
Tennis										
2nd term	2	13%	3	20%	8	53%	2	13%	0	0%
3rd term	2	13%	4	27%	5	33%	3	20%	1	7%
Volleyball										
2nd term	1	7%	6	40%	5	33%	2	13%	1	7%
3rd term	2	13%	4	27%	3	20%	6	40%	0	0%

Table 3: Amount of subject knowledge perceived by female students in the six areas of activity comprising the NCPE

Activity	Very good knowledge		Good knowledge		Can get by		Little knowledge		No knowledge	
	n	%	n	%	n	%	n	%	n	%
Athletics										
2nd term	0	0%	3	27%	4	36%	3	27%	1	9%
3rd term	0	0%	4	36%	3	27%	3	27%	1	9%
Dance										
2nd term	0	0%	2	18%	3	27%	5	45%	1	9%
3rd term	0	0%	6	55%	1	9%	4	36%	0	0%
Gymnastics										
2nd term	1	9%	1	9%	5	45%	3	27%	1	9%
3rd term	2	18%	6	55%	2	18%	1	9%	0	0%
OAA										
2nd term	0	0%	3	27%	2	18%	4	36%	2	18%
3rd term	0	0%	3	27%	4	36%	3	27%	1	9%
Swimming										
2nd term	3	27%	4	36%	2	18%	2	18%	0	0%
3rd term	3	27%	3	27%	4	36%	1	9%	0	0%
Games										
Badminton										
2nd term	1	9%	2	18%	6	55%	1	9%	1	9%
3rd term	0	0%	7	64%	3	27%	1	9%	0	0%
Basketball										
2nd term	1	9%	4	36%	6	55%	0	0%	0	0%
3rd term	1	9%	8	73%	2	18%	0	0%	0	0%
Cricket										
2nd term	0	0%	0	0%	4	36%	6	55%	1	9%
3rd term	0	0%	1	9%	5	45%	5	45%	0	0%
Football										
2nd term	0	0%	2	18%	4	36%	3	27%	2	18%
3rd term	1	9%	2	18%	4	36%	2	18%	2	18%
Hockey										
2nd term	2	18%	5	45%	3	27%	0	0%	1	9%

3rd term	3	27%	6	55%	1	9%	1	9%	0	0%
Netball										
2nd term	3	27%	8	73%	0	0%	0	0%	0	0%
3rd term	4	36%	5	45%	1	9%	1	9%	0	0%
Rounders										
2nd term	2	18%	7	64%	2	18%	0	0%	0	0%
3rd term	2	18%	4	36%	4	36%	1	9%	0	0%
Rugby										
2nd term	2	18%	1	9%	3	27%	2	18%	3	27%
3rd term	1	9%	4	36%	3	27%	1	9%	2	18%
Tennis										
2nd term	1	9%	4	36%	3	27%	3	27%	0	0%
3rd term	1	9%	5	45%	3	27%	1	9%	1	9%
Volleyball										
2nd term	1	9%	6	55%	3	27%	1	9%	0	0%
3rd term	1	9%	3	27%	7	64%	0	0%	0	0%

As Table 1 illustrates, the activities identified by the highest percentage of all students as those in which they perceived little knowledge were Dance (57%), OAA (50%), Cricket (46%) and Netball (40%).

As Table 2 shows, the activities identified by the highest percentage of male students as those in which they perceived little knowledge were Netball (72%), Dance (60%), Swimming (53%) and OAA (47%). As Table 3 illustrates, the activities identified by the highest percentage of female students as those in which they perceived little knowledge were Cricket (64%), Dance and OAA (54% each), Rugby and Football (45% each).

Significant differences were found between male and female students in relation to three Games: Football (mean for males = 2.07 and for females = 3.30; $t = .016$); Netball (mean for males = 4.00 and for females = 1.70; $t < .00$); and Rounders (mean for males = 2.80 and for females = 2.00; $t = .021$). Male students perceived significantly greater knowledge in Football than female students, whereas female students perceived significantly greater knowledge in Netball and Rounders than male students.

Students' perceptions of amount of subject knowledge at the beginning of the third term

As Table 1 shows, at the beginning of the third term of their course, students' perceptions of amount of subject knowledge varied between activities. The activities identified by the highest percentage of all students as those in which they perceived good knowledge were Basketball (77%), Hockey (69%), Badminton and Football (58% each).

As Table 2 illustrates, the activities identified by the highest percentage of male students as those in which they perceived good knowledge were Football (80%), followed by Basketball (73%), Hockey and Rugby (60% each). As Table 3 shows, the activities identified by the highest percentage of female students as those in which they perceived good knowledge were Hockey and Basketball (82% each), Netball (81%) and Gymnastics (73%).

As Table 1 illustrates, the activities identified by the highest percentage of all students as those in which they perceived little knowledge were Dance (38.5%), Cricket (35%), Netball (31%), OAA and Rugby (23% each).

As Table 2 shows, the activities identified by the highest percentage of male students as those in which they perceived little knowledge were Netball (47%), Dance (40%), Swimming (27%) and Cricket (21%). As Table 3 illustrates, the activities identified by the highest

percentage of female students as those in which they perceived little knowledge were Cricket (45%), Athletics, Dance, OAA and Football (36% each).

Significant differences were found between male and female students in relation to four activities: OAA (mean for males = 2.73 and for females = 2.10; $t = .026$); Swimming (mean for males = 2.87 and for females = 2.10; $t = .048$); Football (mean for males = 1.87 and for females = 3.00; $t = .023$); and Netball (mean for males = 3.33 and for females = 1.80; $t = .001$). Male students perceived significantly greater knowledge in Football than female students, whereas female students perceived significantly greater knowledge in OAA, Swimming and Netball than male students.

Changes in students' perceptions of amount of subject knowledge in activities

Results suggested some change in students' perceptions of amount of subject knowledge from the beginning of the second term to the beginning of the third term (see Tables 1, 2 and 3). However, the only significant differences were in Dance (mean = 3.60 at the beginning of the second term and 2.96 at the beginning of the third term, $t = .005$); Gymnastics (mean = 3.12 at the beginning of the second term and 2.48 at the beginning of the third term, $t = .007$), OAA (mean = 3.40 at the beginning of the second term and 2.92 at the beginning of the third term, $t = .043$) and Volleyball (mean = 3.12 at the beginning of the second term and 2.60 at the beginning of the third term, $t = .040$). For these four activities, students perceived that they had significantly greater subject knowledge at the beginning of the third term as compared to the beginning of the second term.

All results above were related to the experience, qualifications and knowledge of students on entry to the course. However, subject knowledge was not related to the background variables of age or prior experience of working with children.

Discussion

The results of this study have to be interpreted cautiously for a number of reasons. First, the sample is relatively small. Second, students were studying on one course. The structure of this course, particularly the school experiences, may have influenced the results of the study. Thus, it is hard to compare perceptions of amount of subject knowledge held by these students with perceptions of students on other courses with different structures. Third, the timing of the administrations of the questionnaire may have influenced the results of the study, e.g. the second administration of the questionnaire was at the beginning of the third term of the course, at a time when students had undertaken no/limited teaching of summer activities, e.g. Athletics, OAA, Cricket, Rounders and Tennis.

A fourth weakness of the study was the question itself. The question identified each area of activity in the NCPE. It identified 10 Games taught in many schools in England, but did not identify separate activities within the other five areas of activity (e.g. long jump, discus, 100m, etc. within Athletics). Rather, for each of the other areas of activity, space was made available for students to insert activities as appropriate. However, this space was not used by many students. Thus, students responded to the question in relation to a number of different Games, but only gave a general answer in relation to the other five areas of activity. Differences between students' perceptions of amount of subject knowledge in activities within these other five areas of activity cannot be identified. Thus, specific activities in which students perceived good or little knowledge may be hidden in the general answer. In order to make more detailed comparisons between the areas of activity in the NCPE, specific activities within each of the areas of activity need to be clearly identified.

Differences in subject knowledge

Results suggested that activities in the NCPE in which students perceived good knowledge were dominated by Games. Basketball and Hockey were identified by a high percentage of both male and female students as activities in which they had good knowledge. Results also showed that there were a range of activities in which students perceived little knowledge. These included Dance, OAA and Cricket for both male and female students.

These results can be explained by the dominance of Games identified in students' prior experiences, qualifications and knowledge of activities on entry to the PGCE course (see above). The reason for this dominance has been suggested by authors such as Fairclough and Stratton (1997), OFSTED (1995b), Penney and Evans (1994) who identified Games as the dominant activities in school PE curriculum. In looking at the balance of content in school curricula OFSTED (1995a) indicated that 'in a substantial proportion of schools the curriculum over emphasises Games, in particular invasion Games' (p.12). The authors calculated from various studies the average distribution of curriculum time at KS3 as: OAA - 2%; Swimming - 4%; Dance - 8%; Gymnastics- 12%; Athletics - 19%; Games - 51%. Thus, time devoted to games may have resulted in these students having more secure knowledge in Games than any of the other areas of activity in the NCPE. On the other hand, it may have had an indirect influence. Choice of activities in which these students participated outside school may have been influenced by activities offered in the school PE curriculum. Thus, these students chose to participate in Games, rather than other activities in the NCPE. With limited introduction to activities such as Dance or OAA at school, young people may be less likely to participate in such activities outside school.

There are several implications of difference in students' perceptions of amount of subject knowledge in different activities in the NCPE. If students have little knowledge in an activity they are less likely to be confident in teaching that activity, and are, therefore, less likely to teach that activity in PE curriculum or extra-curricular time. On the other hand, students may be more likely to teach activity(ies) in which they have good subject knowledge. Thus, students are most likely to teach Games in curriculum and extra-curricular time. They are, therefore, able to contribute to the government's aim to 'put sport back at the heart of school life' (DNH, 1995). However, this is a disadvantage in that the curriculum and opportunities for extra-curricular activity(ies) may continue to be dominated by traditional team Games such as Football, Hockey, Netball and Rugby. Thus, a limited range of activities are experienced by pupils in school, which may limit their choice of physical activity after leaving school.

Differences in subject knowledge may also impact on subject application. The suggestion by DfEE (1998) that secure knowledge and understanding enables students to teach their subject confidently and accurately is of major significance in ITE courses. For example, students with secure subject knowledge are more likely to plan lessons appropriate for the pupils in the class, differentiating activities/tasks for pupils of different abilities and setting tasks appropriate for the wide range of pupils' abilities. Feedback to pupils is more likely to be specific and corrective as well as positive and supportive. As well as subject application, it is also more likely that classroom and behaviour management are effective if subject knowledge is secure, e.g. Kounin (1970) noted that teachers who do not present material at an adequate pace and who jump from one activity to the next without smooth transitions are asking for pupil inactivity and possible disruption. Links between perceptions of amount of subject knowledge and activities taught and between subject knowledge and subject application need to be studied further.

Gender

Results also suggested that students' perceptions of amount of subject knowledge in some activities was related to gender. At the beginning of the second and/or third terms, male

students perceived significantly greater knowledge in Football whereas female students perceived significantly greater knowledge in Netball, Rounders, OAA and Swimming. Further, a higher percentage of male students identified traditional male Games of Football and Rugby as well as Badminton and Athletics and a higher percentage of female students identified traditional female Games of Netball and Rounders as well as Swimming and Gymnastics as activities in which they perceived good knowledge. On the other hand, male students identified Netball and Swimming and female students identified Rugby, Football and Athletics as activities in which they perceived little knowledge.

Differences in perceptions of amount of knowledge by male and female students was related to the different backgrounds and experiences which these students brought to the PGCE course. These differences are likely to be the result of male and female students having been taught different activities in the school PE curriculum and having had different opportunities for participation in extra-curricular activities and outside school. Male students are more likely to have been taught Football, Rugby and Cricket and female students are more likely to have been taught Hockey, Netball and Rounders whilst at school. Also, male students may have experienced a more limited curriculum than female students. OFSTED (1995a) found that 'in a substantial proportion of schools ... the programme for boys is sometimes more limited than for girls' (p.12). Differences in perceptions of amount of knowledge in different activities by male and female students may result in differences in confidence in teaching different activities. This, in turn, may impact on the curriculum offered, as indicated above.

Thus, both boys and girls lose out if the curriculum and extra-curricular activities are dominated by Games, especially if they are not good at, or do not like, traditional team Games. Girls lose out because research has suggested that girls take part in team Games less than boys; and boys, because of the limited range of other activities taught. Further research is needed in this area.

Changes in students' perceptions of amount of subject knowledge

Results suggested a complicated picture of changes in students' perceptions of amount of subject knowledge. They suggested a perceived increase in amount of knowledge in some activities from the second to the third term, with a significant increase in Dance, Gymnastics, OAA and Volleyball. Students' perception of an increase in amount of subject knowledge could be for a number of reasons, e.g. they were receptive to gaining knowledge in activities in which they perceived little knowledge, therefore, put in effort to gain knowledge and/or were given considerable help and/or opportunities to gain knowledge through, for example, collaborative planning and/or teaching.

However, there were a number of activities in which students did not perceive that their subject knowledge had increased, e.g. Football for male students and Netball for female students. These activities are those in which the highest percentage of students perceived good subject knowledge in term 2. Lack of perceived increase in subject knowledge could be for a number of reasons. These students were likely to have been more confident in teaching these activities, therefore they may not have felt that they needed to improve their knowledge or may have been less receptive to learning. Consequently, they may have spent less time and/or put in less effort to gain knowledge in these activities, relying on what they already knew or concentrating on gaining knowledge in activities in which they perceived weaknesses. Such results need to be investigated further.

Suggestions for action to help students to develop subject knowledge

Results of this study suggest that there are differences in students' perceptions of amount of subject knowledge in different activities and that there are some areas of activity in which a high percentage of students perceive little knowledge. Some of the implications of

differences in perceptions of subject knowledge have been highlighted above. Reeves (1993) reported discussions which identified difficulties for students in gaining knowledge across the areas of activity in the NCPE and suggesting the need for some agreement and standardisation about the breadth of subject knowledge that Bachelor of Education (BEd) and PGCE students should acquire. However, at the present time students require breadth and depth of subject knowledge to teach all areas of activity in the NCPE. To be awarded QTS, students must demonstrate that they have a secure subject knowledge and understanding of all areas of activity in the NCPE and are able to teach them confidently and accurately. Thus, it is important that steps are taken to enable students to gain subject knowledge in all six areas of activities in the NCPE. Three ways in which subject knowledge may be addressed are discussed below.

Experiences which students require on PGCE courses to develop subject knowledge

Within school-based PGCE courses, the organisation of courses and of school experiences, how best to spend the time available in the HEI and schools, and the roles of HEI and school subject mentors need to be kept under review to provide appropriate learning opportunities for students to gain subject knowledge across the areas of activity, but particularly in activities in which they perceive little knowledge on entry to the course.

Results of this study showed that Dance in particular is an activity in which a high percentage of students perceived little subject knowledge. HMI (see HEI, 1998) reported that ‘too frequently the balance of training favours those aspects in which the students already have strengths’ (p.3) and Morgan (1997) identified that not enough time was given to Gymnastics and Dance on PGCE courses. He suggested that more attention should be given to these two areas of activity in HEI based work. Thus, it is important that ongoing consideration is given to how HEI based time is allocated and whether the time allocation for different activities is appropriate, e.g. should less time be devoted to Games and more time to Dance, Gymnastics and other areas of activity in which students perceive little subject knowledge? Alongside consideration of time allocation, reconsideration is also needed of how that time is used. For example, if students have good subject knowledge in a number of Games, is time best spent on a generic approach considering principles and different approaches to the teaching of Games rather than looking at specific skills and tactics for a number of different Games?

Some HEIs offer coaching and other courses in the evenings and at weekends to help students to gain subject knowledge. However, offering such courses can also create problems. Morgan (1997) identified that ‘the additional teaching and coaching courses in sporting activities give students opportunities to gain additional qualifications. Students value them, but the course fees are becoming increasingly prohibitive’ (p.31). Further, attendance at such courses may add to the tiredness experienced by students due to the demands of the PGCE year. Perhaps greater consideration needs to be given to the development of subject knowledge within the course, particularly within the school-based part of the course.

HMI (see HEI, 1998) reported that students ‘experience all six areas of the National Curriculum in the core programme, but frequently have no opportunity to teach all aspects in schools’ (p.3). Likewise, Reeves (1993) pointed out that it may be difficult to ensure that all students have a full experience of all areas of activity on school experience. Therefore, ongoing consideration needs to be given to the links between the core programme in the HEI and how time in schools is best spent.

In making decisions about how time is spent in schools, it is important that students are given opportunities to gain subject knowledge in areas of activity in which they have little knowledge. This requires information both of students’ perceptions of subject knowledge across the areas of activity in the NCPE and of activities taught in the curriculum of schools

in which students are placed on school experience. Audits of students' perceptions of subject knowledge and of activities offered in each term in each school in the partnership enable matching of students' needs and activities taught in schools. The outcomes of this audit may require more careful (and maybe joint) planning between HEIs and schools to ensure that students are able to develop subject knowledge in areas of activity in which they have little knowledge and to teach all areas of activity in the NCPE.

Ongoing consideration needs to be given to how school based time is used across the year to enable students to develop subject knowledge as well as subject application. Most courses and their partnership subject mentors use a range of learning opportunities to help students to gain subject knowledge, including observation by the student of the mentor teaching, collaborative teaching and the mentor observing the student teaching. Consideration needs to be given as to whether opportunities are used at appropriate times and stages in students learning, e.g. is too much emphasis placed on students teaching towards the end of the year, even though students may have little knowledge in the different activities taught in the summer term and probably have not taught those activities previously? Could observation by students of their mentor, collaborative teaching and other learning opportunities have a greater role to play later in their course?

In addition, other arrangements may need to be made to provide students with opportunities to develop a breadth of subject knowledge, e.g. enabling groups of students to meet together at specific times during the school experience to research activities in the NCPE; arranging for a group of students to work with a subject mentor in a specific school on a specific day on an activity in which that subject mentor has expertise; or a student spending time in another school on a regular basis to learn about/teach another activity. These may be more useful if an audit of subject mentors' subject knowledge were conducted to identify their strengths across areas of activity, both in subject knowledge and in subject application.

If subject mentors identify activities in which they lack subject knowledge, it would be beneficial to make available to them the opportunities provided for students to gain subject knowledge. Such a development is more likely to take place if in-service provision becomes an integral part of teacher education policy, as suggested by Hardy (1996). The career entry profile completed by students at the end of their PGCE year should identify activities in which they need to develop knowledge further on entry to their NQT year. NQTs may also be able to take advantage of the opportunities provided for students to gain subject knowledge as part of their continuing professional development.

Selection procedures for secondary PGCE PE courses

Due to limited time in the PGCE year for students to develop subject knowledge, it is beneficial for them to have knowledge across the areas of activity in the NCPE prior to entering their PGCE course. However, 'PGCE students arrive at HEIs with a multiplicity of first degrees and it is therefore difficult to ensure that they have sufficient knowledge to teach all aspects of NCPE' (Reeves, 1993, p.56). Thus, if students have a variety of experiences, qualifications and knowledge, and if it is unlikely that PGCE PE courses will be able to select students who have knowledge across all six areas of activity in the NCPE, it is important to identify and begin to address students' subject knowledge weaknesses before they enter PGCE courses. Morgan (1997) identified the need for HEIs to 'exercise greater scrutiny of students' initial degrees and their background in physical education before students are admitted to the courses' (p.32). Hardy (1997) suggested that, in future, selection procedures for PGCE PE courses must pay more attention to prospective teachers' knowledge and experience of activities in the NCPE. Decisions should be made at interview about the knowledge that applicants are bringing to the course and the minimum amount of knowledge that they must acquire before the course starts. This may require some applicants to develop

subject knowledge in some activities before entry to the PGCE course. Fulfilment of requirements for the development of subject knowledge may be a condition of entry to the course.

In order to identify and address subject knowledge weaknesses, most PGCE courses conduct an audit of students' subject knowledge, either before or at interview. The results of this audit are used to advise students of activities in which they need to develop subject knowledge prior to starting the course, e.g. by taking coaching courses or attending other courses, or other mechanisms such as observation of, and reflection on, teaching in secondary school PE departments. Further, several HEIs or groups of HEIs are now offering intensive pre PGCE courses to enable students to develop subject knowledge prior to entry to the PGCE course. Ongoing consideration is needed as to subject knowledge requirements for entry to a secondary PGCE PE course and how students can achieve these.

Preparation of students for secondary PGCE PE courses on sports-related degree courses

Identification at interview that students' subject knowledge is insufficient for entering a PGCE course is only one solution to the problem as students have limited time to address their knowledge weaknesses prior to entry to the course. Students may need longer to develop subject knowledge appropriate for teaching the NCPE. One obvious area for consideration is the sports-related degree courses which many entrants to PGCE PE courses have followed. Such courses are not designed for students who wish to progress to a PGCE course. However, entry to a PGCE PE course is probably the exit route undertaken by the highest percentage of students from sports-related degree courses (e.g. approximately 30% in each of the last three years at the institution at which the students in the present study were studying). It would therefore seem sensible if this was recognised by those responsible for sports-related degree courses and if routes were offered through such courses to help to prepare students for entry to a PGCE course. One way of doing this is for sports-related degree courses to include a range of practical activities across areas of activity in the NCPE (possibly with students being required to choose one or more activities other than Games and activities in which they have little prior experience or knowledge). They may also include courses/modules which provide some underpinning theory for teaching. A few sports-related degree courses offer such routes, but it would be beneficial if such routes were offered through a larger number of degree courses.

Kennedy (1991) found that majoring in an academic subject did not guarantee that teachers had the kind of subject knowledge that they needed for teaching. However, he found that courses which contained educational experiences that required prospective teachers to reason about their subject, to argue alternative explanations and to test hypotheses, seemed substantially to alter students understanding of the subject. Kennedy suggested that this contributed to their subject knowledge. This suggests that in addition to considering the content of degree courses in order to prepare students to enter PGCE courses, the teaching methods should also be considered. Emphasis should be placed on those teaching methods which encourage discussion, debate and analysis to promote students' understanding of the subject matter. This may be difficult in a climate of large student numbers, with lower staff: student ratios, and hence a tendency towards more lecture based courses.

Conclusion

This study has looked at secondary PGCE PE students' perceptions of amount of subject knowledge in areas of activity in the NCPE. Subject knowledge has been considered in its own right, as it is important that students have secure subject knowledge to teach the NCPE. However, it is also important as the base from which students can develop subject application. It is hoped that the results of this study provide baseline information from which further research on subject knowledge can be conducted. For example, further research is

needed into reasons for differences in amounts of subject knowledge in the areas of activity in the NCPE in relation to students previous experiences and qualifications. Research is needed into the nature of the knowledge that students deem to be lacking. Research is also needed to find out how students' define subject knowledge. It is also important to find out how subject mentors define subject knowledge if they are to help students to develop knowledge.

It is not clear how students develop subject knowledge, what advice/help they need from their subject mentors and what mechanisms should be used by subject mentors to help students to develop their subject knowledge. Booth (1993) noted that students 'want mentoring advice which centres on the immediate, practical issues of subject-specific teaching' in the early stages of their work in schools (p.194). Peterson and Comeaux (1987) suggested that simply telling novices what experts know will not produce expertise because it takes time for novices to master the demands of teaching. Research is needed in this area. Research should also look at the opportunities that should be available to enable students to develop their subject knowledge. In addition, the implications of different amounts of subject knowledge for teaching, and the relationship of subject knowledge to subject application, need to be explored. Finally, it is recognised that subject knowledge is only one factor influencing students' teaching performance. Research is therefore needed into the interaction of subject knowledge and other factors as they influence subject application.

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