

# Teaching strategies and pupils' social development in physical education

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## Abstract

If physical education is to make a more worthy contribution to the development of the whole child, and also enhance its status in the contemporary school climate of curriculum change, then it can be argued that some change in the traditional curriculum, combined with an attempt to incorporate more sensitive and varied teaching strategies, will be needed. The principal focus in this action research and development project was, therefore, on the teaching strategies necessary to change gymnastics lessons from teacher command and whole-cohort teaching, towards resource-based lessons where pupils took more responsibility for their own, and others', learning and where the emphasis was on personal and social as well as physical development.

One hundred and eighty-three 12-year-old boys in a 12-16-years boys' high school were assigned to one of four treatment groups described as follows. Two experimental groups, CLR(1) and CLR(2), required children to learn from resources which had been specially prepared in booklet form for the research project. A third group, CLT, required Children to Learn from the Teachers. The same skills were taught as for the two experimental groups, but in this case only the teachers had access to the resource booklet and they taught the skills by a traditional direct process. The fourth group, Control, received the normal gymnastic programme where the teachers used a predominantly direct style of teaching. The CLR(1), CLT and Control groups had gymnastics once a week, while the CLR(2) group received gymnastics twice a week. All four groups were based upon 'intact' mixed-ability classes, and each was examined in terms of psychomotor and affective development throughout a term's gymnastic lessons.

Four physical education teachers, four student physical education trainee teachers and the writer, a university physical education lecturer, all taught some aspects of the programme. The children in each group received a different teacher at the half-way stage of their gymnastic course.

The Flanders Interaction Analysis System (FIAS) was used to analyse videotapes and identify pupil-teacher interaction differences between the four groups. Children in the two experimental groups showed significant gains in self-concept scores, but only the experimental group (CLR(2)), taught for an extra lesson a week, out-performed other groups on gymnastic skills. Teachers in the experimental groups solicited more pupil talk, asked more questions and issued fewer commands than those in the Control and the CLT groups.

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## Introduction

In the 1980s a number of researchers have combined to make the careful scrutiny of classroom processes a central issue in both research and the training of new and experienced teachers. Significant new developments like the General Certificate of Secondary Education (GCSE), the Technical and Vocational Education Initiative (TVEI) for 14–18-year-olds and the Certificate of Pre-vocational Education (CPVE) all presuppose that teachers will change their existing styles and engage in more negotiation with pupils, employ teaching strategies which facilitate pupil inquiry, investigation or decision-making, and provide experiences from which pupils can develop understanding or self-confidence. Given that over 60 per cent of teachers will be over 40 in the early 1990s and that many have developed their own favoured styles of teaching over 15–20 years, substantial changes in teachers' behaviour will not always be readily achieved. In addition, the shift since April 1987 to more school-based in-service courses further emphasizes the need to study what happens in classrooms, especially when teachers make a considerable effort to change what they do.

In the field of physical education the teaching of gymnastics offers an interesting case study. Physical education is frequently excluded from discussions about curriculum because it is assumed that the subject is self-contained, separate from other disciplines and has its own set of precepts, objectives and *modus operandi*. This research has concentrated on the teaching of gymnastics within physical education, and a number of the findings are of wider significance in the present climate.

In a survey of one local education authority Bott (1985) reports that most of the teachers were not able to provide a ready answer to the question: 'why do you teach gymnastics?' Williams (1985) concludes that gymnastics has become a 'contentious issue' because of the conflict which occurred within the profession relating to the style of teaching it. The argument about teaching styles has mirrored discussions in other subject areas. In the 1960s and 1970s there was considerable debate about whether gymnastics should be taught by a 'traditional' didactic process or by what some writers called an 'educational' process, that is, one which involves the nurturing of the whole pupil. Williams also suggests that an examination of common ground between the two views would 'prove more fruitful' and even help to clarify some of the misinterpretations that have been made over the last two decades.

This polarized argument about teaching gymnastics has further divided the teaching profession because of the names commonly used to differentiate the two processes, i.e. 'formal' gymnastics or 'educational' gymnastics. This over-simplified, dichotomized view of teaching has its parallels in other subjects in the curriculum, notably 'old' and 'new' mathematics, and indeed in 'traditional' and 'progressive' primary education.

It is, therefore, not surprising that some writers, like Lister (1983) reporting a 'Current Ideas' congress held at Dartford in 1983, have recognized the decline in the teaching of gymnastics and advocated the view that: 'the only way forward was to "wipe the slate clean" and present a new approach to the subject, possibly under a different name.' Reducing the debate about teaching gymnastics to one about two stereotyped extremes, however, does not assist progress in the field, and Crutchley (1985) raises further problems when he states that 'gymnastics is one of the most difficult activities to teach'. Yet the teaching of gymnastics ought not to be significantly more difficult than teaching mixed-ability classes in any subject. Primary teachers, in particular, are trained to have different children working at appropriate levels for the whole of their school day. Physical education teachers, on the other hand, have largely been taught the skills of whole-cohort teaching, which is a considerably easier form of managing children's behaviour.

For many physical education teachers the idea of resource-based learning, requiring pupils to work on their own, or with peers, and the devising of individualized programmes, is a relatively new concept. The novelty lies in the fact that the principal concern in physical education programmes has traditionally involved the achievement of aims within the

psychomotor domain. While the striving to achieve these aims must not be lost, the process of achieving them needs a closer analysis than has hitherto been given. To be concerned with children's attitudes, personal relationships and values – all at the centre of the affective domain – must be an equally fundamental concern if the subject is to contribute effectively to the development of the whole child. However, the popular image of physical education teachers may lead critics to suppose that they will find it more difficult to change than teachers of other subjects. They are often stereotyped as a homogeneous group whose personalities and teaching strategies tend to alienate a disproportionate number of children.

### Characteristic/personality of PE teachers

Hendry (1973) states: 'The mass media (films, TV, magazines etc) tend to show the physical educationalist as a muscular, dominant, aggressive, social individual – a man of action rather than words.' This viewpoint is supported by Cassell (1963) whose study of physical education students, using his own 'Test of Social Insight' indicated that physical education students were found to be highly competitive and aggressive and revealed poor 'social insight'. Similarly, Eysenck's (1947, 1964) Personality Inventory showed the PE students were significantly more extroverted than their general college colleagues, tending to be 'aggressive, lose their tempers quickly and be unable to keep their feelings under tight control'. Kane (1968) gave further support to these findings and produced evidence to suggest that this personality profile applied equally well to male and female physical education specialists. Hendry (1973), in his review of work relating to the personality of physical education teachers, sees no reason to disagree with findings already outlined:

while as a group physical education students were sociable, they were also aggressive – verbally and intellectually – showing self assertive behaviour. Linked to this was a high achievement drive, a strong emphasis on authority (to which they were submissive) and discipline.

Even though one can argue that the contemporary student may not be the military martinet of yesteryear, the writer's experience over the past 25 years would support the research data above and would even suggest that the views expressed by Terson (1967) 20 years ago is an accurate description of the present student model:

You got drunk, sang rugby songs, you jeered at the History students or English specialists, you were banned from the college drama festival for jeering at something you didn't understand, you brought back pub signs from Bristol, Cheltenham or Wolverhampton when you played away, you glorified your strength, you got all the girls.

More recent writers still perpetuate the image. Rogers (1979) writes of PE teachers as 'sadistic clowns clad in shorts', while Woods (1979) finds them people with 'strong strident voices' who 'display potential physical aggression in shorts, singlets, muscles and a smell of sweat and embrocation'. Chandler (1980) is particularly harsh in her condemnation of women physical education teachers and in so doing highlights the power of the hidden curriculum. She questions the maturity of women physical education teachers who do not respect the feelings that some girls have about exposing their naked bodies in showers: 'It is this lack of maturity which is often responsible for all the disagreements about trivia such as showers, and PE kit, and which therefore destroys for an unnecessary number of girls all enjoyment of the subject.'

## Process and product in physical education

In recent years there has been considerable research in the study of classroom processes, though very little of it is related to physical education. Professor Locke, in an interview reported by Graham (1981), stated: 'We really haven't had any full-scale process-product studies in PE and I think we are not likely to because of the tremendous demands for resources.' Locke, in the same interview, also stated that research on teaching physical education should be: 'action research to the degree that it involves people actually watching physical education teachers teach, and systematically devising data from that process.'

However, there is little to report before Siedentop (1972), Cheffers (1972), Mancini (1974), Nygaard (1975) and Anderson (1975). As a result of the work of these authors, many observational schedules which specifically describe teacher and pupil behaviours in physical education lessons were developed. Darst, Mancini and Zakrajsek (1983) summarized these instruments under the headings of: 'Interaction Analysis Systems', 'Use of Behaviour Analysis Systems', 'Multi-Use Observational Systems' and 'Coaching and Teaching Observation Systems'. Most of these quantitative schedules have their foundations in the Flanders Interaction Analysis System (FIAS) (Flanders, 1970), and the writer used this system and an adapted version for his own research. The Flanders system has ten categories: teacher accepts feelings (1), gives praise (2), accepts pupils' ideas (3), asks questions (4), lectures (5), gives commands (6), criticizes (7), pupil solicited talk (8), pupil spontaneous talk (9) and silence, confusion, etc. (10). The observer notes down the category best resembling classroom talk every three seconds, and tallies can then be displayed in a  $10 \times 10$  matrix (Flanders, 1970). It has been used extensively in classroom interaction studies, often in a modified form, and has been criticized by, among others, Delamont and Hamilton (1976) for ignoring context features, concentrating on the observable and easily quantified and using pre-specified categories. However, in conjunction with other forms of data gathering, it can offer useful supplementary information.

On the surface the Flanders System may not be applicable to PE because of its focus upon verbal interactions. However, when challenged by Cheffers (1979) about the application of his system to physical education, Flanders replied, 'I suspect that describing physical education classes is not difficult - physical education teachers never stop talking!' Anderson (1975) partly corroborates this when his own analysis of videotaped PE lessons revealed that many teachers rarely kept quiet for periods in excess of five seconds, while most teachers spent less than 2 per cent of their time listening to what students said. In each lesson there appeared to be a lack of two-way communication, and Anderson's analyses confirm the largely didactic and imperative nature of the American physical education lessons he videotaped.

To identify other features of verbal behaviour, Nygaard (1975) used the Flanders Interaction Analysis System to analyse the verbal interaction patterns of 40 physical education teachers, who were randomly selected from lists of all teachers in Missoula, Montana. The primary pattern of 5-10-6-10-5 (lecture, silence, directing, silence, lecture) was revealed for the total group of teachers. A secondary pattern of 5, 4, 8, 3, 5 (lecture, question, answer, acceptance, lecture) was also elicited.

Mawer and Brown (1983), in their study of 20 British primary and middle school teachers, found that teachers gave more negative feedback, particularly the trained PE teachers, than positive feedback. Even though they did not use the FIAS, it does confirm the largely unsupportive climate of PE lessons. Lombardo and Cheffers (1983) concluded that:

In an era characterised by a revival of humanism in education, the lack of teacher empathy revealed in this study reaffirms the direct and often autocratic approach commonly employed by physical educators.

However, this may be over-critical when similar comparisons are made with classroom

teachers in other subjects.

Wragg (1971), in his study of 578 lessons in the classroom, recorded some 337,617 individual behaviours of which only minimal percentages were recorded in the category of teachers accepting pupils' feelings. He pointed out that what one might call humanistic teaching can be revealed in other ways, particularly in the form of praise and acceptance of pupils' ideas. However, in physical education research investigators have usually found little praise or acceptance of pupil ideas and minimal questioning in physical education lessons. Pupil-initiated activity was also non-existent and their contribution to the lesson was overwhelmingly non-verbal.

The predominance of teacher-dominated and controlled PE lessons has persisted throughout the century, and a Schools Council inquiry (Kane, 1974) based on questionnaires sent to 575 schools in England and Wales found that men teachers most often used a direct class teaching style rather than guided discovery or individualized learning. A factor analysis of responses showed strong support, however, for such matters as 'personal education', 'social concern' and 'rapport with children', all firmly in the affective not solely psychomotor domain.

Yet one of the few real changes in physical education teaching in Britain has come about as a result of a more individual approach to the teaching of dance and gymnastics after the influences of the 1933 PE syllabus. Whitehead (1969), in an extensive analysis of the syllabus content of male physical education colleges in Britain, and a representative sample of boys' secondary schools, found an extremely limited curriculum despite the influences of educational thought and practice on other subjects. As the PE curriculum is dominated by games teaching (Kane, 1974), it would appear that only for a small percentage of the programme, i.e. in dance and gymnastics, has some attempt been made to change methodology, and teachers are still some way from handling mixed-ability classes effectively. Pain (1986) suggests that a change of focus is now occurring because of a greater emphasis upon health education, but he maintains that 'physical education in the UK still tends to be authoritarian' and that this has 'serious implications' if objectives within the affective domain are to be achieved.

Adorno *et al.* (1950) outline the main characteristics of an authoritarian personality as possessing a strong tendency to conform, being rather inflexible in thinking and having a dependence on authority. Hendry (1973) makes reference to Adorno's work and surmises that this 'type' would require a highly predictable environment with little uncertainty, ambiguity or innovation and change. If this is so, then it could explain why Whitehead and Hendry (1976) have argued that no real changes have occurred since the 1933 PE syllabus. An authoritarian style of teaching demands conformity and minimal interaction. The *process* is one means whereby teachers perpetuate a model of teaching which requires pupils to listen, absorb and respond uniformly, rather than debate, question and respond individually. Ulrich (1977) summarizes the situation:

Traditionally physical education has been segregated as to sex, has been built around the acquisition of sports skills, has tended to teach skills at a beginning level, and has treated students in terms of behaviourist conditioning methods. Physical education has seldom carried academic credit, has been a required course for all students, has catered to motor behaviours whilst ignoring the affective and cognitive aspects of human behaviour and has been contained within the class period, never making demands for out-of-class preparation or out-of-class enrichment.

### The pressures for change

Physical education teachers' professed interest in the affective domain is mirrored by current pressures for more attention to be given to children's personal and social development. These come from several sources, and if PE is seen exclusively as the teaching of games, or is

concerned only in the development of motor skills, it could easily be excluded from debate and decision-making within schools. Among sources of influence are the following.

(a) *The European Council for Human Rights*

In May 1983 the Council presented a detailed resolution to 21 European countries stating that 'Human Rights Education' should be taught as early as the first years of primary school. David Lister (1983), in a contemporary account of the event, reports on the resolution and states that the Council recommended that 'Human Rights Education' (HRE) should include:

Education for mutual respect and tolerance, according equal value to individuals, being supportive of minority groups and including working co-operatively.

The significance of this statement is highlighted by Ian Lister, Professor of Education at York, when in the same article, he states:

that there will be a need for a change of style and method for many teachers. Conventional frontal teaching would not be sufficient. Teachers would obviously have to develop skills of discussion... along with an increased use of drama and role play in class.

(b) *Unesco*

In April 1976 the United Nations Educational, Scientific, and Cultural Organization (Unesco) organized its first international conference for 'Ministers and senior officials responsible for physical education and sport in the education of youth'. This was the first time that Unesco had devoted so much time and effort, and financial resources, to the subject.

As a result of this initial conference, a permanent Inter-governmental Committee on Physical Education and Sport was established, and this committee produced the International Charter of Physical Education and Sport (1980). Some extracts from this charter are included below because of its support for the personal, social and moral curriculum. It begins by stating that for the effective exercise of human rights, physical education and sport is a fundamental right for all:

The freedom to develop physical, intellectual and moral powers through physical education and sport, must be guaranteed both within the educational system and in other aspects of social life.

It also has advice for the curriculum-makers:

Every overall education system should assign the requisite place and importance to physical education and sport in order to establish a balance and strengthen links between physical activities and other components of education.

It also makes recommendations about how one should teach physical education:

Physical education programmes should... suit the requirements and personal characteristics of those practising them... should help to create habits and behaviour patterns conducive to each person's full development.

(c) *The DES*

In 1984 the Department of Education and Science introduced the 17+ examination, the Certificate of Pre-vocational Education (CPVE). Thousands of pupils take this examination and the syllabus contains a large vocational element at the core of which lies an emphasis on personal and social development. However, even more young people have just begun new courses in relation to the General Certificate of Secondary Education where aims and objectives within the affective domain are clearly defined and a change of teaching strategy for all subject areas is emphasized.

(d) *The Manpower Services Commission (MSC)*

The changed employment prospects for young school-leavers, and the requirement of employers, have acted as a catalyst for the MSC to attempt to influence the school curriculum. The major innovation is the Technical and Vocational Educational Initiative (TVEI), whose objectives for fourth- and fifth-year pupils are assembled under the heading of 'Social and Life Skills' (MSC, 1977). One reason for their social emphasis is based upon research findings (Jones, 1983), which found that employers not requiring academic qualifications as a passport for work were now placing more emphasis on the personal and social qualities of applicants, e.g. being responsible, trustworthy, pleasant, having the ability to work in teams and communicate effectively. More recently, Winiarski-Jones (1987) asked employers to rate the importance of 20 factors when they considered a school-leaver for a job. Reliability, trustworthiness and punctuality came top of the list, closely followed by a willingness to learn, ability to work in a team and a sense of enthusiasm. Good qualifications and examination results were placed much lower in the list of importance.

(e) *LEAs and schools*

As well as co-operating with the MSC initiative, local authorities have also positively responded to a wide range of DES publications. Examples are *Curriculum 11-16* (1977) and *Aspects of Secondary Education in England* (1979), and the Further Education Unit's publication, *Developing Social and Life Skills* (1980). All emphasize the need to show more concern for the personal and social development of children and to place it more centrally on the curriculum. A typical LEA response is illustrated by quoting an extract from the Devon County Council Education Committee paper on 'The School Curriculum' (1982):

The curriculum should promote the quality of...his or her relationships and attitudes towards people...assist pupils' awareness of moral values...make sure that pupils learn tolerance towards others...develop personal qualities through an understanding of emotion, intellect and spirit...prepare people who are independent and co-operative.

The Devon paper outlined the basic curriculum for the first three years and then outlined the 'Core and Options' programme for years four and five:

The core must include *English, Mathematics, Science and Religious Education*. *Personal, social and moral education* must also be provided for all pupils with the content and method of courses being shaped to suit differing needs and capacities. The same must be true of *physical education*.

## Change constraints

### (a) *Role expectations*

The pressures upon the physical education teacher are similar to the pressures on all teachers who are expected to produce a high pass rate in examinations or demonstrate that their pupils achieve high standards in some public manner. Hoyle (1969) wrote: 'The teacher's role has been influenced by the elitist values pervading the educational system, and on the whole has been committed to promoting these values rather than securing advance along a broad front.' Like music or drama teachers, PE teachers appear to be faced with two conflicting roles. On the one hand, they have to focus upon the curriculum role which will benefit all pupils and, on the other hand, they are expected to produce public show-pieces – such as trophy winning – which the rest of the school can identify with proudly. However, striving for excellence is not to be discouraged, although when this diverse concentration upon a minority of children affects the education of a majority of the children, then the matter is more serious.

### (b) *The training institutions*

After 25 years of training teachers of physical education, the writer believes that the characteristics of PE students have changed little. It is only during the past four or five years that a real attempt has been made to challenge the traditional beliefs described above. If the predominantly authoritarian style of teaching, as already described, is to give way to something which fosters children's social as well as motor development, then it is the nature and quality of the training processes which may make a significant difference. The emphasis in college and university courses will need to reflect a serious attempt to change the behaviour of students who arrive with some 15 years of a successful experience on the games field or in the gymnasium. Their initial perceptions of the teaching role is conditioned by years of traditional teaching, and unless university and college courses challenge stereotyped beliefs and explore alternatives, then the profession is unlikely to change. Brown (1958) stated, nearly 30 years ago, that:

The emphasis is first, last and all the time on teaching ... other things are of secondary importance. However desirable it may be, personal ability in the gymnasium, swimming pool or playing field is no substitute for teaching ability.

However, if the evidence suggested by Kane (1974) that teachers do want to achieve aims within the affective domain, then training programmes need to heed the advice of Pring (1983):

The promotion of PSME requires a close examination of the school 'atmosphere', the relationships within the school, the values implicit within group working relationships, the regular hidden messages given throughout the curriculum ... nonetheless, one should think also in terms of specific curriculum and classroom practices.

## The research programme

In order to explore the development of alternative styles of PE teaching where an emphasis would be on personal and social as well as motor development, a research programme had to be designed which involved the following features:

- 1 The creation of resources which allowed pupils to work together as members of a

collaborative group.

- 2 Teachers covering the same kind of activity (in this case gymnastics) but using different teaching styles, involving those which were based on negotiation and trust, not solely on command-giving.
- 3 A clear set of guidelines for pupils which encouraged collaborative working and independence.
- 4 Some scrutiny of process using classroom observation which would show whether teaching styles were implemented in a consistent manner and in accordance with whatever principles and precepts were supposed to underpin them.
- 5 Some kind of outcome measures which might show whether certain styles of teaching were related to gains in skill or changes in attitude or self-concept.

Physical education is still commonly taught at the secondary stage to separate sexes. A boys' high school for 12-16-year-olds, where the head and PE staff were willing to co-operate, was identified, and all 186 12-year-old pupils in the first year were involved in the programme. A booklet of visual resources was produced by the researcher and a copy was given to each child which illustrated a range of graded gymnastic tasks. The first section of the booklet clearly explained that pupils were going to learn in a new way and aspects of what is normally regarded as the hidden curriculum were made explicit. So in order to maintain a focus upon these social aspects, a large card was always pinned to the gymnasium wall before the lesson (Figure 1). Nine teachers participated in the research. They included the four PE teachers at the school, four third-year students on final teaching practice and the researcher.

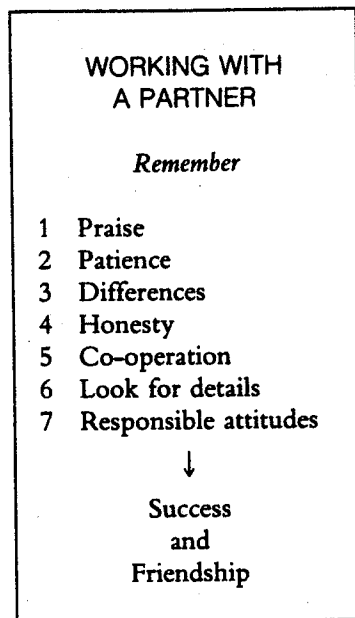


Figure 1: Social wall-chart

## The research design

Classic research designs, with well-controlled experimental and control groups, are not easy to achieve when both research and development work are undertaken in naturalistic settings. The school authorities have determined such matters as the membership of class or subject groups, and timetable constraints usually mean the researchers must operate within existing procedures rather than exert direct control.

Campbell and Stanley (1963) have written an authoritative account of experimental and quasi-experimental design. Of the many designs they posited, one seemed best suited to the present research, better than a one-shot case study, permitting both experimental and control groups but recognizing that the school had already determined some factors. Campbell and Stanley state:

One of the most widespread experimental designs in educational research involves an experimental group and a control group both given a pre-test and a post-test, but in which the control group and the experimental group do not have pre-experimental sampling equivalence.

They call this the 'non-equivalent control group design'.

The classes in the first year, even though membership had been determined by the school, not the researcher, came near to equivalence on a number of measures, as described below. It was decided to compare classes taught in the 'new' style, i.e. with the book of resources, with emphasis on collaborative groupwork, social help and the model of teacher support described above, with classes being taught the same gymnastic skills but without either the resource book or the teacher behaving in the predetermined manner described earlier. There would also be a control group. Table 1 shows the research design, and  $O_1$  and  $O_2$  represent the pre- and post-test measures.

Table 1: The research design

Class	Research group	No. of pupils	Pre-test	Treatment	Post-test	Frequency of treatment
21A } 21C }	1	53	$O_1$	CLR	$O_2$	1 week
21D } 22C }	2	51	$O_1$	Control	$O_2$	1 week
21B } 22B }	3	52	$O_1$	CLT	$O_2$	1 week
22A	4	27	$O_1$	CLR	$O_2$	2 week

### (i) Grouping

Each class had been allocated approximately 27 pupils by the school authorities and the classes were designated with the following titles: 21A, 21B, 21C, 21D, 22A, 22B, 22C. These classes were split into four sub-groups in order to make larger sample sizes for experimental comparisons:

- Classes 21A and 21C became research group 1 (CLR(1));
- Classes 21D and 22C became research group 2 (Control);
- Classes 21B and 22B became research group 3 (CLT);
- Class 22A became research group 4 (CLR(2)).

(ii) *Frequency of treatment*

Groups 1, 2 and 3 received treatment, i.e. the experimental programme, once a week, for one hour, while group 4 received treatment twice a week ( $2 \times 1$  hour). All groups were given the same pre-tests and post-tests.

(iii) *Treatment*

Groups 1 and 4 – classes 21A, 21C and 22A – were taught by the experimental process where Children Learn from Resources (CLR(1)) and (CLR(2)). Each child received a book of the gymnastics resources, and the intention was to create a climate of largely self-directed learning with pupils assuming some social responsibility. The social guidance wall-chart, described above, was displayed in every lesson.

Group 3 – classes 21B and 22B – were taught the same gymnastic skills as illustrated in the resource booklet but teachers used the traditional didactic style where the Children Learn from the Teacher (CLT). The children in these classes never saw the resource booklet and were entirely reliant upon the teacher for information. The social guidance wall-chart did not appear in their lessons.

Group 2 – classes 21D and 22C – acted as the control group where the teachers involved were not party to the processes being used in groups 1, 3 and 4. These classes received the programme of gymnastics which the school had always used – a traditional skill-oriented process determined by the teacher. The materials used in this programme turned out to be very different from the ones used in the other groups.

(iv) *Pupil variables*

It is not easy to measure effectively all the desired outcomes of any experimental programme. Some objectives in physical education, like lifelong health and fitness, are simply not susceptible to short-term appraisal. Sometimes what is measurable in the short term is not especially of interest to teachers. Furthermore, it is not easy to ascribe changes in attitude or behaviour exclusively to an experiment lasting one or two hours a week for a term. However, it was decided to take six pupil measures which would both give an indication of any initial similarities or differences between classes as well as, in some cases, offer a criterion measure of change of attitude or improvement in skill.

The following seven variables were recorded for each child:

- (a) Verbal reasoning quotient;
- (b) Fitness level;
- (c) Self-concept;
- (d) Gymnastic concept;
- (e) Gymnastic ability;
- (f) Height and weight.

(a) VERBAL REASONING QUOTIENT

The NFER Verbal Reasoning Test had been administered in the children's middle school and the writer was not involved in the procedures. This was the main variable upon which pupils had been allocated to classes by the school.

(b) FITNESS LEVEL

The school was also partially influenced in the allocation of children to classes according to whether they had represented their middle school in any sport. The writer was not sure that this was a valid test of ability or fitness levels and consequently the JCR test – Campbell and Tucker (1964) – was administered to all children. This is a test designed to measure the fitness elements of strength, speed, agility and endurance – the major requirements for gymnastic competence – and Phillips (1947) states: 'In its original form, reliability coefficients ranging from 0.91 to 0.97 were obtained, and when validated against a nineteen-variable criterion of physical fitness a multiple R of .90 resulted.' The test was simple to administer, requiring very little apparatus, and norms were available for British boys (Cooper, 1963).

(c) SELF-CONCEPT

The various methods used to assess pupils' self-concept reflect a variety of conceptual disagreements, as reviewed by Crandall (1973) and Burns (1979). One of the most common methods used has been the verbal method, particularly the self-report questionnaire (Piers and Harris, 1964; Coopersmith, 1967). The writer selected the Piers-Harris self-concept test because of the following combination of advantages which were particularly relevant to this research programme:

The scale was designed for children in the nine to 13 age range.

It had better reliability (Metcalf, 1981) and validity (Cox, 1966) than many other tests.

It measured global self-concept and included several body-concept and games-concept questions.

It could be completed in 15 minutes.

It was, therefore, a particularly suitable test to administer.

(d) GYMNASTIC CONCEPT

The writer could find no test which specifically measured the attitude of children towards gymnastics. Some work has related to attitudes towards physical education (Williams, 1982), and Kenyon (1968) suggested that perhaps attitudes towards physical activity were a function of 'body-esteem, self-esteem, need for approval and social values'. In view of this, the writer decided to construct his own test.

According to Burns (1977), self-concept relates to the 'collection of attitudes and beliefs we hold about ourselves'. Because of this, a test was constructed using the style of questions as contained in the Piers-Harris self-concept test, although a five-point Likert-type scale was used for assessment. A few examples, below, indicate the logic of developing this new attitude questionnaire, from the Piers-Harris test, which consequently enabled the test to be related specifically to gymnastics:

Piers-Harris: I am good in my school work.

The Writer: I am good at gymnastics.

Piers-Harris: I am strong.

The Writer: I am strong enough for gymnastics.

Some statements were reversed:

Piers-Harris: I hate school.  
The Writer: I enjoy gymnastics.

Negative questions were also included:

Piers-Harris: My classmates make fun of me.  
The Writer: My classmates make fun of me in gymnastics.

(e) GYMNASTIC ABILITY

Marliave, Fisher and Dishaw (1972) state that 'it is difficult to find reliable and valid measures of student achievement in PE'. Even international judges are frequently in disagreement about scores in relation to gymnastics, particularly at a high level. In view of this, considerable efforts were made to measure - subjectively and objectively - the gymnastic ability of all 183 boys taking part in this research programme.

The British Amateur Gymnastics Association (BAGA) lists 40 activities which are considered to be the fundamental basic skills of gymnastics. They have a core foundation of *taking weight on hands, rolling and vaulting* over apparatus. Because of this, it was decided to test all 183 boys on their ability to perform:

- (i) a handstand;
- (ii) a forward roll;
- (iii) a vaulting activity of their choice.

All of the seven classes were videotaped during their first PE lesson. They were also videotaped, using exactly the same procedures, at the end of the gymnastic programme, some 10 weeks later.

Before any analysis took place, the tapes were cut into 14 separate tapes, i.e. a separate tape existed for pre- and post-test for all seven classes. In order to remove any possible effects of observer bias, all the subsequent analysis took place without the observers knowing whether they were watching pre- or post-test performances. The observers also had nothing to do with the research programme and could be considered neutral.

*Subjective Analysis of Videotapes.* Two experienced PE lecturers, with a very good background of gymnastics teaching, were asked to watch all the tapes and give a score for every performance, i.e. 183 children performing three or four activities.

The writer was, however, still dissatisfied that the scores from these expert judges may have contained inaccuracies. Because of this, he enlisted the help of university physical education students and attempted to reach a more objective score for each pupil.

*Objective Analysis of Videotapes.* Twelve students and the writer spent some 20 hours analysing the performance of the children. The aim, using the videotaped materials, was to analyse each skill by breaking down that skill into *smaller units*, e.g. take-off. Each student was then assigned one of these smaller units to observe and score.

The criteria for each 'smaller unit' was explained to all the students and this 'limited view' of each activity enabled a very accurate profile of the skill to be recorded. The present writer simply had to add up the observed scores for each smaller unit and that was the total for that particular child.

*Gymnastic Ability Score.* Both subjective and objective forms of assessment achieved similar results. Both the observers were consistently high in agreement, showing a Spearman

coefficient of correlation of 0.728. The correlation between the observer scores and the objective student scores were similarly high, 0.825. Because of this, it was decided that the final gymnastics score should reflect the subjective and objective scores. The totals were therefore added up from the three observations to give a score for the *forward roll* for each pupil, a score for the *handstand* for each pupil and a score for the *vault* for each pupil.

The three separate scores were then totalled to give the pupil his final gymnastic score:

Observer A gave pupil X 3.5 points for the forward roll;  
Observer B gave pupil X 4.0 points for the forward roll;  
Students gave pupil X 3.5 points for the forward roll.  
Score for pupil X = 11.0 points.

The process was a long and laborious one but was necessary in an attempt to answer the criticisms that any gymnastic assessment may not be reliable or valid. In order to achieve the final pre- and post-test scores, some 9140 observations were made by university students analysing the 'smaller units' and the two experienced observers analysing the whole skill.

#### (f) HEIGHT AND WEIGHT

Both height and weight variables were measured while the pupils were waiting to enter the gymnasium where they would be videotaped for their gymnastics assessment. These two physical parameters were necessary in order to see if any one class had significantly different somatotypes within them. Few gymnasts are overweight, few gymnasts are tall. Most, however, are short and of medium build which gives them the mechanical and muscular efficiency needed to be a good gymnast.

#### (v) *The teaching staff*

All four physical education teachers at the school, four third-year final teaching practice students specializing in physical education and the present writer made up the nine teachers involved in the research programme. This number of teachers was required in order to help validate the results of the different treatments. If, for example, group 1 eventually performed better than group 3 at the end of the research, it could have been due to teacher influence rather than the materials. Because of this, each class had a change of teacher half-way through the programme.

#### ASSIGNMENT OF TEACHERS AND STUDENTS TO CLASSES

The teachers and students were not randomly assigned to teach specific classes. The member of the school staff responsible for the timetable had already allocated their teachers to specific classes without taking into account the research programme.

#### ASSIGNMENT OF THE TEACHERS TO CLASS TREATMENTS

The teachers were not randomly assigned to the specific treatments for the following reasons.

(a) The head of the physical education department considered one of the staff his most competent gymnastics teacher. This teacher taught more gymnastics than any other member of

staff and his work would be more representative of a good gymnastics programme if he took the control group. It would have been a waste of time to make any comparisons with a weak programme.

(b) The head of department considered his oldest member of the department to be too traditionally orientated to be able to make the required change of behaviour. This teacher was, therefore, assigned to group 3 (CLT), where he was required only to make adjustments to *what* he taught and not *how* he taught. Both the head of the PE department and one other teacher were happy to make the behavioural changes required to teach group 1 (CLR(1)).

(c) This writer had made a specific request to take one of the classes twice a week, using the experimental resources (CLR(2)).

#### THE EXPERIMENTAL GROUPS – RESOURCES

Teachers whose classes were working from the resource book group CLR(1) and CLR(2) were asked to be very conscious of matching their own behaviour to those on the social wall-chart. As a result, all six of the teachers who used the resource book agreed that they themselves would not display physical or verbal aggression towards the children. This undertaking is in accord with Wheldall and Merrett (1984), who state:

A child who is physically punished for errors or misdemeanours can easily learn to adopt the same tactics with his juniors and may justify his bullying by suggesting that adults punish him for doing things that they disapprove of and he is applying the same principle to those that get in his way.

They also agreed to adopt similar procedures for deviant behaviour, and this is where the social wall-chart proved to be a useful aid. Each teacher adopted the following disciplinary pattern.

On the first occasion a boy was deviant, e.g. swinging a rope to hit someone, or not supporting his partner, attention was politely drawn to the seven points on the wall-chart and he was asked where he thought he was letting himself down. In almost every case this was sufficient to prevent further similar occurrences. However, on the few occasions that a recurrence of inappropriate behaviour was observed, the boy was asked to sit quietly at the side of the gymnasium and observe how responsibly the rest of the class were working. When he felt he could act in a more responsible way, he was asked to communicate this to his teacher and then re-join the working environment. It is important to remember that these procedures were conducted in a friendly manner. There was no raising of the voice and no physical contact. The social climate which ensued in most lessons was very different from anything this writer or other participating teachers had previously experienced.

The greatest portion of the resource booklet contained a series of workcards from which children could work on their own, with a partner or as part of a group. The initial tasks were designed to be uncomplicated in order that the new way of learning would be easily accommodated. Eventually the tasks became more complex and required a higher level of socially supportive behaviour. The intention behind all of the work with the experimental classes was to foster social help and make collaboration at least as important as achieving competence in a range of psychomotor skills.

Figure 2 shows a typical task from the resource book which permitted two pupils to work collaboratively on improving each other's jumping skills. Mosston (1981) has formulated eight styles of teaching which range on a continuum from Style A, where teachers make all the decisions, to Style H, where responsibility is transferred entirely to pupils. In Mosston's scheme the activity shown in Figure 2 would be designated Style C, reciprocal teaching, where



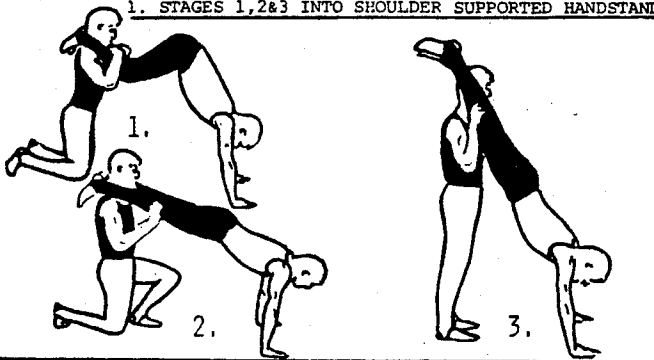
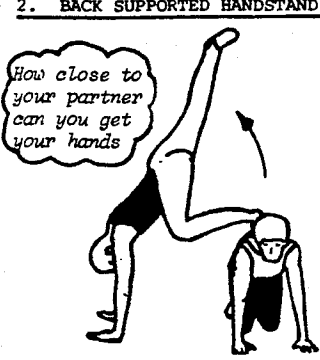

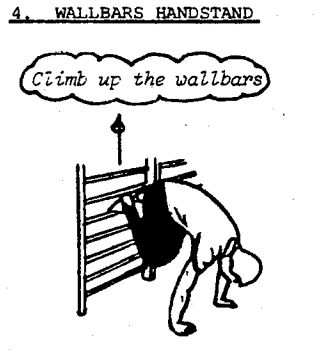
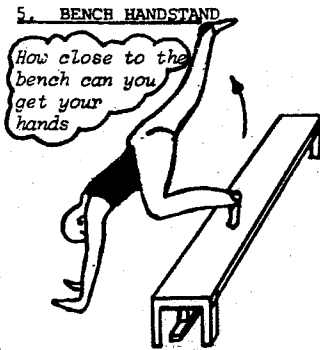
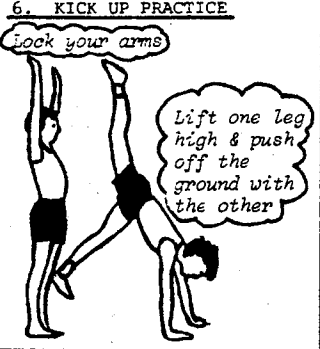
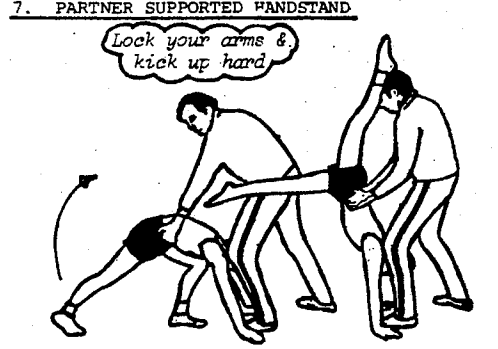
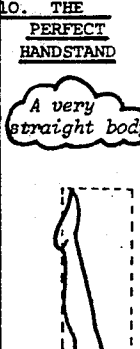
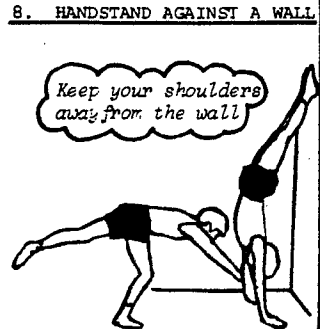
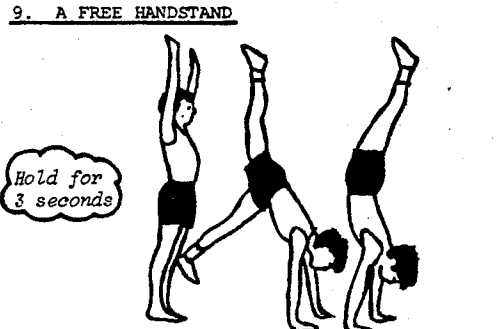
NAME	FORM	Tick the box when you feel you are successful									
		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
<p>1. STAGES 1,2&amp;3 INTO SHOULDER SUPPORTED HANDSTAND</p> 		<p>2. BACK SUPPORTED HANDSTAND</p> 									
<p>3. POMMEL HORSE HANDSTAND</p> 		<p>4. WALLBARS HANDSTAND</p> 			<p>5. BENCH HANDSTAND</p> 						
<p>6. KICK UP PRACTICE</p> 		<p>7. PARTNER SUPPORTED HANDSTAND</p> 					<p>10. THE PERFECT HANDSTAND</p> 				
<p>8. HANDSTAND AGAINST A WALL</p> 		<p>9. A FREE HANDSTAND</p> 									

Figure 3

- FIRST
- SECOND
- THIRD
- FOURTH
- FIFTH
- SIXTH
- FINALLY

- Find a partner who will help you to learn the activities.
- Take it in turns to help. Learn one activity at a time.
- Put a ✓ in the  when you finish each activity.
- Do the activities in any order you choose.
- Hold these positions for 3 seconds.
- Try to link all activities into a flowing sequence.
- Put a tick in this box  when you have finished the sequence.

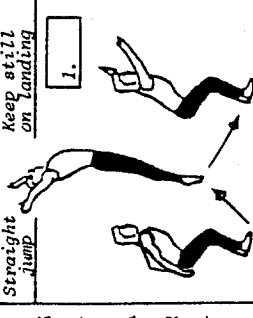
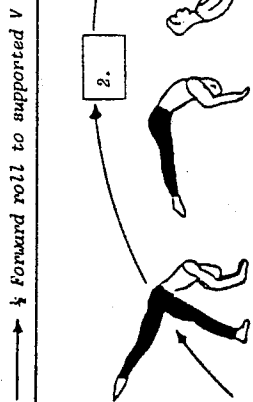
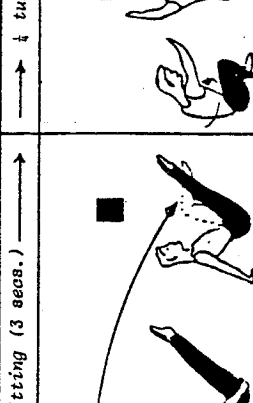
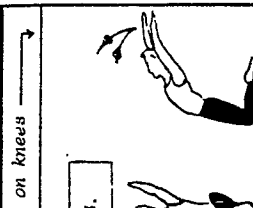
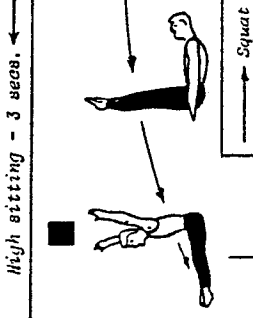
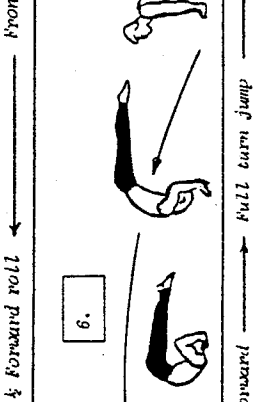
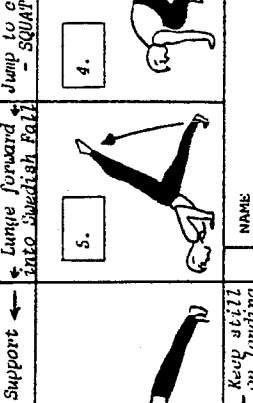
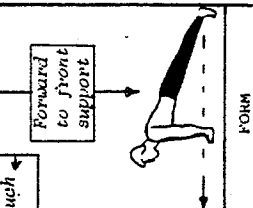
<p>Keep still on landing</p> <p>1.</p> 	<p>2.</p> 	<p>3.</p> 	<p>4.</p> 
<p>High sitting - 3 secs. ←</p>	<p>→ Front Support</p>	<p>→ Jump to crouch - SQUAT -</p>	<p>→ Forward to front support</p>
<p>→ Squat forward</p>	<p>→ Full turn jump</p>	<p>→ Keep still on landing</p>	<p>→ Turn to front Support</p>
<p>5.</p> 	<p>6.</p> 	<p>7.</p> 	<p>8.</p> 
<p>NAME _____</p>			
<p>FORM</p>			
<p>SEQUENCE</p>			
<p>F I N I S H</p>			

Figure 4

chose. They then tried to help each other put all the skills together in a flowing sequence. This aspect alone took more than one lesson. As partners began to work at different rates, the use of the other four sequences allowed the more competent children to progress at their own pace. Consequently, at the conclusion of this particular series of activities, one boy from the pair could have been working on sequence L, while his less able partner was working on sequence T. In both cases they were continually helping each other. This aspect of learning is of interest not solely to physical education, in that it suggests pupils can help peers achieve objectives which they themselves are unable to achieve.

The pattern of each sequence was designed such that all of the movements could be contained within a small two-metre-square area. It enabled the whole class to be doing the same activity at the same time, provided there were enough mats.

Apparatus work is a more exciting, and potentially more dangerous, aspect of gymnastics. It was introduced after four weeks of developing the children's skills and responsibilities via the media already outlined. For success and safety in this work, it was crucial that children should support and help one another. To be dependent on someone else, for safety reasons, offered an opportunity to develop trust and co-operation between individuals. Figure 5 illustrates one of the tasks, taken from the resource booklet, which relates to vaulting.

One of the major deviations from traditional work was in allowing each group to alter the arrangements of the apparatus in any way that they felt would be helpful to individuals within their group. The task card illustrates a variety of different apparatus arrangements. And this was one area of work where, after a while, the groups spontaneously arranged their apparatus to suit all individuals and then produced group sequence work. This required a great deal of co-operation and leadership and their results were often demonstrated to the rest of the class.

During the research teachers reported several instances of children making adjustments to the apparatus which they themselves had not previously conceived. Since the pupils knew better than their teachers what their limitations and aspirations were, interventions by the teacher were usually confined to such matters as safety, an inescapable responsibility of the teacher and one which was frequently exercised through a convergent question such as: 'what would happen if you put the box too close to the wall?' The reward for having worked responsibly at each apparatus station was the freedom to move wherever they liked, with an understanding that it would be unfair to monopolize one piece of apparatus for too long. During the research pupils tended both to select activities they particularly enjoyed such as swinging on ropes and to return to apparatus where they still had to master the skills. Though not a state of total autonomy, this did permit a degree of pupil decision-making beyond what is frequently encountered in more traditional gymnastics lessons, described earlier.

Rarely did the lessons follow a regular pattern. The three major phases were:

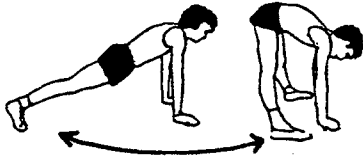
- 1 Warm-up.
- 2 Floor work.
- 3 Apparatus work.

Lessons sometimes followed a 1 + 2 pattern, sometimes a 1 + 2 + 3 pattern and sometimes a 1 + 3 pattern. The task-card system, which enabled the teachers to use a variety of styles, required a great deal of organization and preparation before the lesson commenced. However, this was no more than is required of teachers who teach mixed-ability groups in the classroom. It just meant that the teachers had to make sure that writing implements, measuring devices and resources were brought to each lesson.

# ASTRIDE OR STRADDLE VAULT

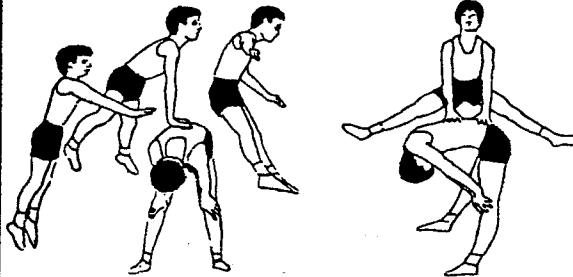
## 1. FLOOR STRADDLE JUMP

Practise moving your legs backwards and forwards. Make them as wide as you can.

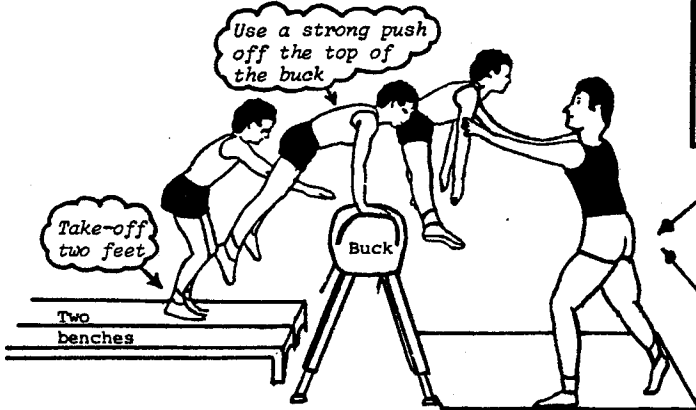


## 2. LEAP FROG

The base must be firm and strong with the head well-tucked in. Try to push the base over before vaulting over him.



## 3. VAULTING OVER APPARATUS (arrange your apparatus as shown)



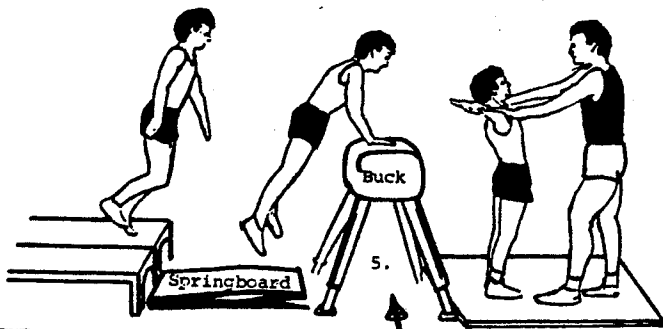
### VERY IMPORTANT

If you are going to be successful at vaulting you need to develop confidence in a supporter.

STAND WITH FEET APART  
STAND CLOSE TO APPARATUS  
GRASP PARTNERS BICEPS.

Move back quickly. If you do this properly you can almost pull your partner over the apparatus.

## 4. SPRINGBOARD STRADDLE VAULT



NAME	
FORM	
Tick when completed	
ACTIVITY 1	<input type="checkbox"/>
ACTIVITY 2	<input type="checkbox"/>
ACTIVITY 3	<input type="checkbox"/>
ACTIVITY 4	<input type="checkbox"/>
ACTIVITY 5	<input type="checkbox"/>

5. When you can manage the four activities above try vaulting without using the springboard

**BUT YOU MUST USE A SUPPORT UNTIL YOU ACQUIRE REAL CONFIDENCE.**

Figure 5

## Results of the research

### 1 Pupil variables (pre-test)

As it was not possible to randomize the experimental and control groups, existent classes were used for the different treatments. The research school allocated children to classes based upon a series of criteria which they considered to be important and relevant. Table 2 gives the results of all the pre-tests which were used to measure 10 pupil variables. These measures were as described above, VRQ, height, weight, the JCR (jumps, chins, runs) test of physical ability, self-concept, gymnastics concept and the gym test scores for handstand, roll and vault, plus the total score for all three. The means are shown in Table 2, and analysis of variance (ANOVA) showed that none of these variables displayed any significant differences at the 0.05 level or beyond. The slightly higher than average verbal measuring score is explained partly by the school having been reorganized several years previously from being a grammar school.

Table 2: Pre-test results for 10 pupil variables

Variables – Research groups – Treatments – Results						
Variables	All	1	2	3	4	(1-4)
	n = 183	n = 53	n = 47	n = 51	n = 27	n = 4
	Mixed	CLR(1)	Control	CLT	CLR(2)	ANOVA
	M	M	M	M	M	SIG
VRQ	106	106	104	106	107	p = 0.700
Ht.	59.7	59.7	60.1	59.4	59.6	p = 0.765
Wt.	90	89	94	86	89	p = 0.177
JCR	2.1	2.3	1.9	1.8	2.3	p = 0.280
SC	57	56	58	57	56	p = 0.840
GC	60	61	58	61	58	p = 0.617
Hand	12.8	12.4	12.1	12.9	14.7	p = 0.427
Roll	17.6	17.4	17.4	18.2	17.3	p = 0.430
Vault	14.3	14.8	13.4	15.1	13.4	p = 0.150
Total	44.7	44.6	42.9	46.3	45.4	p = 0.358

The VRQ, height and weight variables were not measured at the end of the programme, partly because it was assumed that no major changes would occur during the relatively short period of a few months and partly because little would have been gained. The JCR fitness test was used at the pre-test stage but the scores are not discussed. The reason for this is because the post-test was invalidated on the day it was administered as the gymnasium floor was so slippery that the shuttle-run scores were considerably lower than at the pre-test stage. It was not possible to re-administer the test, and since these inhibited scores would have distorted the cumulative total of jumps, chins and runs, they were not included.

There were no instances of missing data other than the inevitable sample mortality on the pre-tests. As this was slightly under 10 per cent (18 children out of 183), these pupils were simply dropped in the test calculations.

## 2 Attitude variables (pre- and post-test)

The level of significance found for within-group differences between scores obtained at pre- and post-test stages are indicated in the tables in the following way:

- Significant at the 5 per cent level = \*  $p < 0.05$   
Very significant at the 1 per cent level = \*\*  $p < 0.01$   
Highly significant at the 0.1 per cent level = \*\*\*  $p < 0.001$

Since initial differences had been shown to be insignificant, t-tests were undertaken to compare pre- and post-test scores.

### (a) SELF-CONCEPT PRE- AND POST-TESTS

All four groups improved their mean self-concept scores during the programme. However, the CLR(1) and CLR(2) groups who were receiving the experimental programme were the only ones to show a significant improvement at the 5 per cent level in self-concept scores, as illustrated in Table 3, though the change is undramatic.

Table 3: Self-concept improvements

Group	Mean improvement	t	p
CLR(2)	4 points*	2.36	0.026
CLR(1)	3 points*	2.40	0.021
CLT	3 points	1.77	0.084
Control	1 point	1.22	0.228

### (b) GYMNASTIC CONCEPT, PRE- AND POST-TESTS

All groups registered a gain of between 9 and 12 points in their scores on the gymnastic concept test, showing an improvement in attitude towards gymnastics significant at beyond the 0.001 level. There was, however, no significant difference between the groups. The inference to be drawn is that when pupils have the opportunity, on starting secondary school, to practise gymnastics in a large gymnasium, they become much more positively disposed to it, irrespective of teaching style employed. The experimental CLR(2) group, which employed a resource book and associated teaching style twice per week, registered the highest mean gain of 12 points.

## 3. Gymnastic performance measures

Handstanding, forward roll and vaulting ability scores were compiled at the beginning and at the end of the research programme, and Table 4 illustrates these scores. Again, analysis of variance was used for comparisons between groups, and t-tests for within-group comparisons.

### (a) HANDSTAND (HAND 1 AND HAND 2)

Whereas no significant differences had been noted before the programme on any of the

gymnastic variables, analysis of variance showed highly significant post-test differences to exist between groups at the end of the programme. Table 4 illustrates that the pre- and post-test mean handstand scores for the CLR(1) group made a highly significant drop of 2.5 points ( $t = 4.04, p < 0.001$ ). The handstanding ability has actually declined. A similar feature occurred for the CLT group although the drop in the mean score was not significant. The Control group, however, improved its mean score for the handstand by 3.2 points which was highly significant ( $t = 4.58, p < 0.001$ ). The CLR(2) group also improved its mean handstand score, but it was not significant.

Table 4: Gymnastic performance pre- and post-test scores

Variables	1	2	3	4	(1-4)
	n = 53	n = 47	n = 51	n = 27	n = 4
	CLR(1)	Control	CLT	CLR(2)	ANOVA
	M	M	M	M	SIG
Hand 1	12.8 ***	12.3 ***	13.7	14.7	p = 0.427
Hand 2	10.3	15.5	12.2	15.0	p < 0.001
Roll 1	17.7	17.1 **	18.7	17.3 **	p = 0.430
Roll 2	18.1	18.5	19.4	19.1	p = 0.590
Vault 1	15.0 **	13.1 ***	15.4 ***	13.4 ***	p = 0.150
Vault 2	17.5	17.3	19.1	22.5	p = 0.005
Total 1	45.5	43.3 ***	47.8	45.4 ***	p = 0.358
Total 2	45.9	51.4	50.2	56.6	p = 0.016

The reason for the CLR(1) group showing a drop in handstand scores is not obvious. The scores may have been affected by one of the two classes in the group being less well behaved than other classes. During the first half of the programme, before apparatus was used, they did not respond to using task cards in a positive manner. Several disruptive children continually spoiled the rhythm of the lesson, and the teachers found it very difficult to motivate them. Some boys described gymnastics as being 'cissy' and it was not until the apparatus stage that their attitudes changed. For some, it appeared that their middle school experiences had created very negative attitudes towards the gymnastic environment, particularly in relation to non-apparatus work. Although they had shown an improvement in their attitude to gymnastics as described earlier, theirs was the lowest gain on this measure of all the groups.

(b) FORWARD ROLL (ROLL 1 AND ROLL 2)

All groups improved in the forward roll although Table 4 shows that it was not significant for the CLR(1) group and the CLT group. The CLR(2) group, however, has not shown this same trend, even though exposed to the same programme, but in an extended form; they improved their mean handstand scores and significantly improved their rolling score. This suggests that twice a week may provide a better gymnastic programme on this measure than once a week although this trend is magnified further in the next section.

(c) VAULTING (VAULT 1 AND VAULT 2)

This is the variable which, because pupils had a uniform opportunity to learn, is more suitable for comparisons between the groups. With the exception of the CLR(2) group, all experienced

four lessons where children were attempting to perform the same vaulting activities. All groups improved very significantly or highly significantly during the programme:

CLR(1) group	( $t = 3.17$ , $p = 0.003$ )
Control group	( $t = 5.62$ , $p < 0.001$ )
CLT group	( $t = 4.66$ , $p < 0.001$ )
CLR(2) group	( $t = 7.75$ , $p < 0.001$ )

However, an analysis of variance showed that significant differences existed between the four groups. The CLR(2) group improvement was significantly better than the improvement measured for the other three groups:

CLR(2) and CLR(1)	( $t = 2.98$ , $p = 0.004$ )**
CLR(2) and Control	( $t = 3.21$ , $p = 0.002$ )**
CLR(2) and CLT	( $t = 2.13$ , $p = 0.039$ )*

No significant differences in improvement scores were found between the CLT, Control and CLR groups. As indicated in the last section, the twice-a-week exposure seems the most likely explanation for such differences between the scores.

#### 4 Teaching styles

One of the concerns in classroom interaction research is the question of implementation whether teachers actually behave in the way that curriculum developers, the experimenter or they themselves wish to behave. If the teachers in the experimental CLR(1) and CLR(2) groups had changed from the authoritarian and imperative style commonly associated with physical education described at the beginning of this article, one would expect fewer commands, more pupil-initiated interaction and other pupil-oriented differences when compared with traditional PE teaching.

So that lessons could be analysed subsequently, they were video-recorded using a fixed wide-angle lens and a radio microphone on the teacher. Lessons were analysed in several ways. The Flanders Interaction Analysis System (FIAS) was used (Flanders, 1970), because this has often been employed in its original or modified form in studies of PE teaching, and, though restricted, does give useful information on predominant verbal interaction patterns. In addition, the writer subscribed each of the 10 categories (Underwood, 1985), so that a distinction could be made between interaction during gymnastic activity, during non-activity, when in pairs or groups and when demonstrations were given by either teacher or pupil. Freehand fieldnotes were also made and critical events recorded. The writer compared his own analysis, using FIAS, of two 15-minute videotapes with three other trained observers who had used the system, and percentage agreement ranged from 81 to 94 per cent. Intra-observer agreement on the same tapes by the writer with his own coding at the beginning and end of the research was 91 per cent. As described above, the observer tallies every three seconds, recording the code number best describing the classroom behaviour under observation, category 2 for praise, category 4 for a question, and so on.

#### 5 Analysis of lessons

All of the quantified coded data were typed into the Prime 750 computer system at Exeter University. Two card-punchers used a verification system, where after the first typing, a second typist repeated the process. The technique used by Flanders (1970) for reducing large

amounts of tallies from his 10-category system to more readily interpretable form is that of aggregating matrices and reducing the cumulative matrix to a new base of 1000, called a 'millage matrix'. Reduction of the raw matrices to a base of 100 enables comparisons to be made between groups. It was a particularly useful technique for this analysis as individual lessons were grouped together for an analysis of the three styles of teaching. Flanders also recommended that a minimum of 700-800 tallies is required before conversion to a millage matrix. In the present research, 37,651 tallies were recorded, the equivalent of over 31 hours of gymnastic activity. Table 5 gives a breakdown of the tallies recorded for each style and the pilot studies.

Table 5: Breakdown of tallies recorded for each style

Style	Tallies	Lessons	Mean	Mean length of lesson recorded
CLR(1)	7,368	10	737/lesson	37 mins
Control	6,644	10	664/lesson	33 mins
CLT	5,772	9	641 lesson	32 mins
CLR(2)	10,512	14	751/lesson	38 mins

(i) PRIMARY PATTERNS OF VERBAL INTERACTION

In order to give an example of how these primary patterns were detected, Table 6 illustrates a

Table 6: First primary verbal patterns for the experimental group

Millage matrix of 10 lessons (7368 tallies)											
Categories and percentages (+10)											
	1	2	3	4	5	6	7	8	9	10	T
1	0	0	0	0	0	0	0	0	0	0	1
2	0	4	1	5	8	8	0	0	2	6	34
3	0	2	2	11	9	2	0	0	3	1	30
4	0	0	0	10	2	0	0	97	2	4	118
5	0	5	1	28	185	28	2	0	20	19	288
6	0	8	0	11	20	50	0	1	12	45	147
7	0	0	0	1	2	1	1	0	0	1	6
8	0	5	23	24	21	16	0	3	6	5	103
9	0	2	4	11	27	10	0	0	6	3	63
10	0	7	0	17	14	30	2	1	12	125	208

millage matrix which was compiled from the analysis of 10 videotapes (7368 tallies), where teachers were using the CLR(1) *Process of Teaching*. The two-dimensional matrix shows the sequence of classroom events. If a question (category 4) is followed by a pupil answer (category 8), then a tally is recorded in the 4-8 cell (counting down four rows, then across eight columns). Thus Table 6 shows that 97 tallies out of 1000 occurred in this 4-8 cell; nearly 10 per cent of the lessons, therefore, involved a transition from teacher question to pupil answer.

A flow-chart can be superimposed on the matrix to show where most interaction occurred. Table 6 shows that in an experimental CLR group using the resource book once per week the flow of verbal behaviour commences at cell (5,5), the sustained lecture category, which is where the highest percentage of behaviours were recorded (18.5 per cent). The technique for tracing these verbal flow-patterns is as recommended by Flanders (1970), and it involves commencing with the cell containing the highest number of tallies, linking to the next most highly tallied cell in the relevant row, and so on.

The matrix in Table 6 illustrates that the teachers who were using the CLR(1) process of teaching were using two primary patterns of verbal behaviour in their lessons. After 'lecture', category 5, they either continued the interaction by asking questions, category 4 (2.8 per cent), or giving directions, category 6 (2.8 per cent). Table 7 illustrates the pattern of verbal interaction when the teacher follows the 'lecture' phase with 'questioning'.

The pattern is clear until the 5-5-4-8 stage is reached, when it appears that these teachers varied their responses to pupil talk by:

asking another question,	cell (4,4), 2.4 per cent
or developing the pupils' ideas,	cell (8,3), 2.3 per cent
or continuing to give information,	cell (8,5), 2.1 per cent

The broken lines indicate the alternative interactions.

The numerical sequencing below represents the first of two primary patterns which were identified for the CLR(1) group of teachers:

5-5-4-8-4-4  
                   3-4  
                   5-6

The matrix in Table 7 illustrates a different verbal interaction when category 6, giving directions, is taken as the route to establish the alternative primary pattern.

Table 8 shows the distribution of each of the 10 Flanders categories over each of the four groups. The two experimental groups CLR(1) and CLR(2) show several differences from the other two groups. Commands, category 6, at 147 and 175 are well below the 256 and 294 of the other groups. Acceptance of ideas (30 and 19) are above the other two groups (10 and 10), as is the amount of both solicited and unsolicited pupil talk, categories 8 and 9, which show twice the amount in the traditionally taught groups, and teachers' questions, category 4, which are also at twice the level.

In summary, the experimental group teachers, based on all forms of analysis, showed the following differences compared with the non-experimental teachers:

- (i) Used more sustained praise.
- (ii) More often accepted and used pupils' ideas.
- (iii) Used nearly three times as many questions.
- (iv) Received twice as many responses.
- (v) Gave half the amount of directions.
- (vi) Found that pupils initiated interactions twice as much.
- (vii) Gave much more opportunity for pupils to work on their own ideas, 'free work'.

Table 7: Second primary verbal patterns for the CLR(1) group

Millage matrix of 10 lessons (7368 tallies)											
Categories and percentages ( $\div 10$ )											
	1	2	3	4	5	6	7	8	9	10	T
1	0	0	0	0	0	0	0	0	0	0	1
2	0	4	1	5	8	8	0	0	2	6	34
3	0	2	2	11	9	2	0	0	3	1	30
4	0	0	0	10	2	2	0	97	2	4	118
5	0	5	1	28	185	28	2	0	20	19	288
6	0	8	0	11	20	50	0	1	12	45	147
7	0	0	0	1	2	1	1	0	0	1	6
8'	0	5	23	24	21	16	0	3	6	5	103
9	0	2	4	11	27	10	0	0	6	3	63
10	0	7	0	17	14	30	2	1	12	125	208

Table 8: Totals of tallies from millage matrices for each category

Behaviour	Category	CLR(1)	Control	CLT	CLR(2)
T accepts feelings	1	1	1	2	4
T praises	2	34	50	48	47
T accepts ideas	3	30	10	10	19
T asks questions	4	118	41	38	73
T lectures	5	288	270	323	324
T commands	6	147	256	294	175
T criticizes	7	6	10	5	3
P solicited talk	8	103	39	36	69
P spontaneous talk	9	63	39	49	88
Silence, confusion	10	208	282	193	196

- (viii) Created more opportunity for work by pre-lesson organization of apparatus.
- (ix) Made considerably less class interventions.
- (x) Used demonstrations more when the class was active.

- (xi) Made more use of partner work.
- (xii) Made much less use of whole-class work units.

The conclusions here are twofold. First, that these teachers did show patterns markedly different from what often occurs in PE lessons. Secondly, the teaching styles they manifested do seem in accordance with the intentions that there should be more opportunities for pupil decision-making and for collaborative social development.

(ii) CRITICAL EVENTS

The videotapes were scrutinized for 'critical events' using the 'critical incidents' technique, as developed by Flanagan (1949). The critical events approach, used extensively in the Teacher Education Project, allows the observer to: 'describe some of the actual happenings in the classrooms on which they based their judgments about whether the student was an effective or ineffective class manager' (Wragg, 1984). The format for collecting initial events is that the observer records what led up to the event in question, what actually happened and what the outcome was.

Critical events are not necessarily spectacular. They are frequently quite ordinary happenings which appear to illustrate some important aspect of regularly observed behaviours. The writer attempted to identify events which illustrated various important aspects of the processes in the pupil groups. These examples taken from experimental group lessons show both positive and negative aspects of the programme.

*Critical Event 1 (Positive Affect).* The task in this case was for the pupils to walk up an inclined bench, along a beam and then down another 'swinging' bench, attached at one end to the beam and at the other to two climbing-ropes:

Steve moves very warily along the beam and hesitates before moving on to the 'swinging' bench. Mark notices that Steve looks very apprehensive about negotiating this more difficult task and moves over to help. He encourages Steve to make the attempt, and walks alongside the bench as Steve completes the challenge. They both return to the starting-point where the roles are reversed and Steve lends vocal and physical support to Mark's attempts at the same task.

This event illustrates the implementation of one of the guidelines in the task-card programme, that pupils should help one another and work collaboratively.

*Critical Event 2 (Positive Affect).* The group of four is working from a task card which illustrates several partner balance activities. They are required to try these balances, making their own choice about which one to use first:

Gordon and Darren are trying one of these balances, but find that repeated attempts bring little success, even though Gordon, as the heavier and stronger of the two boys, is acting as the base for the balance. They both laugh as Darren keeps falling on top of Gordon. Terry, who is also in the same group, and working with his partner, moves over to the struggling pair and suggests that it would be a good idea if one of them tried to support the other two in the balance. This proved to be much more successful and the group continued to work in this pattern sharing the roles of supporting, or being part of the balance. They further renegotiated the task by trying their own balance which involved all four of them. This event, too, illustrates the programme at its most effective stage where pupils are taking responsibility and encouraging each other in accordance with the guidelines. It also gives an

example of the development of initiative and imagination as part of the collaborative process, allowing the whole group to build on the suggestion of one of its members.

*Critical Event 3 (Negative Affect).* Children are working in pairs with the 'jumping' task cards and are using the one-metre-long pieces of string in order to measure the distance they jump:

Roy and Nicholas are motivated by the task and are working well. Roy is just about to make another attempt when Martin, from an adjacent group, flicks his piece of string in a whip-like action around Roy's legs. Roy chases after him calling him a 'stupid twat'. Martin eventually agrees not to do it again although no physical violence occurred between them.

This is a good example of the management dilemmas faced by teachers working in the experimental group. If children are given freedom to move, to decide what to do, and so on, some will occasionally misbehave – the teacher then faces the problem of deciding whether to respond in an authoritarian and positive manner or, in keeping with the programme's aims for pupils, to attempt to persuade the pupil to work collaboratively, not negatively, which is what the teacher did on this occasion.

*Critical Event 4 (Constraints – poor reading ability).* This group is using a task card which does not contain pictures. Three of the group are busily reading the card, while the fourth member, Karl, is not making any attempt to see what is written. Even when the group puts the card down, he makes no attempt to look at it. The other three boys do not appear to think there is anything unusual in Karl's behaviour and just tell him what the group are supposed to do. Karl, however, had a VRQ of 83, and a reading age of nine years, which may be an explanation of his behaviour. Normally PE teachers have not had to face the problem of children of poor reading ability with which their colleagues in classroom-based subjects have had to contend. This event shows that, although the task cards are extensively illustrated, and readability analysis using two different formulae showed a required reading age of 11.5, those children with poor reading or oral ability may become over-dependent on other pupils. It is a problem to which there is no simple solution, but one of which teachers need to be aware.

### (iii) PUPIL EVALUATIONS

All pupils in the experimental groups were asked to complete written evaluations of the programme. The following is a selection from the responses which were in general strongly, though not totally, approving of the programme. (The spellings are as in the original replies.)

(a) Steven has some positive views when comparing the old and the new:

The new system is good because it does not waste so much time. The old system when you had to learn some thing new you had to stop and let the teacher explain and show you what to do. The cards are good because you can go at your own pace and level and when you have finished when the card say's you can add and make up your own versions of it.

(b) David also compares the old and the new and approves of the wider choice of activity:

I think the new system is quite good. It doesn't waste much time when the teacher speaks to you. You can just go off to the apparatus, read the card and get right on with it. Before the teacher had to explain what to do on every bit of equipment which took ages! Then you all did the thing the teacher told you to do instead of doing different variations which are on the card.

(c) John approves of some aspects of the programme but is critical of the task cards and some of the spatial constraints:

With all the activities going on I found that the hall was rather crowded especially when people wanted a run up.

It was good in the way that the teacher didn't have to tell us what to do before hand but with some of the diagrams they didn't explain it well enough for some people. The activities were mostly using different kinds of apparatus for each one which gave a different thing to do.

OVERALL A PRETTY GOOD WAY OF DOING GYM [his capitals].

### Future research

Research in naturalistic settings is almost invariably problematic and subject to constraints, but it does at least allow the investigator to propose better procedures with the benefit of hindsight. If the writer were to repeat a similar study, he would want to make adjustments which would allow for a more valid process-product evaluation.

#### 1 *Population sample*

Even though the gymnastic concept indicated that there were significant positive changes in attitude towards gymnastics, it has been argued above that this may be largely if not entirely explained by the change of gymnasium environment which contrasted with their previous middle school experiences. Subsequent research should recognize this phenomenon and measure attitude changes which occur in the same environment as a result of programme adjustments. In this context it would have been wiser, in retrospect, to have studied the second-year rather than the first-year classes after they had already experienced one year in their new school environment.

#### 2 *Teachers' process adjustments*

None of the teachers in the experimental groups, with the exception of the present writer, had ever taught using the new process. They were only able to change their strategies as a result of several meetings with myself, and watching me teach as often as they could. It meant they were learning how to teach in this style as the programme developed, which made it difficult for them in the early stages. It would, therefore, be more realistic to conduct further comparative research using teachers who had been observed to be more familiar with this new process of teaching at the beginning of the study. At the present stage, unfortunately, there are very few teachers who already have experience of a style based on collaborative groupwork, with the emphasis on social as well as physical development.

#### 3 *Pupil process adjustments*

Like the teachers, none of the children had experienced this process of learning and it was not until the later stages of the programme that the teachers felt the children were spontaneously responding to their new roles. Being responsible for someone else's behaviour, as well as one's own, required a considerable readjustment in traditional habits, and no teacher claimed that all

the pupils had achieved this ideal by the end of the programme.

As a result of teacher and pupil process adjustments, some of the evidence from this research should be treated with caution. The research compared teachers learning how to teach in a new style, working with pupils learning how to learn in a new style, with teachers and pupils who were already familiar with the traditional processes of interaction. As a result, a relatively short innovative programme of this nature cannot be expected to do itself justice. Future research should attempt to compare groups where both teachers and pupils are familiar with the processes. Only then would it be possible to make more valid comparisons between the different styles of teaching. In addition, a larger sample of teachers would need to be studied over perhaps a full school year rather than a single school term, as was the case in the present research.

#### 4 *Product measurements*

There are of course difficulties when trying to assess the outcomes of any programme. Marliave, Fisher and Dishaw (1972) recognized the difficulty of finding valid and reliable measures of pupil psychomotor achievement in physical education and developed the ALT-PE score. However, Pieron (1983) states that 'very little information can be drawn out of data using this system' and suggests that research results are contradictory and inconclusive. In this research there were measurements of such psychomotor products as handstand, roll and vaulting. With hindsight, this may have been an unfair test of the CLR(1), CLR(2) and CLT groups' outcomes since they were exposed to these activities for less time than the Control group. The writer has a suspicion that the Control group teachers spent rather more time on the specific test activities than would reasonably be expected. If the tests had been designed to include partner balances or supporting ability or rope climbing or sequence work or other variables specifically related to the task cards, then the outcomes when compared with the Control group may have been considerably different.

Outcomes in relation to attitudes are subject to even greater scepticism. Legitimate questions about aims and objectives include the following: should teachers be concerned with short-term or long-term outcomes? Do the children enjoy their PE at school and do they continue with an active life-style when they leave school? Long-term measurements are perhaps more important than short-term outcomes – though longitudinal studies over a period of five or 10 years are not available for analysis.

Finally, it would have been desirable to subject the processes observed in lessons to more analysis where the focus was exclusively on pupil-pupil interaction within groups. The procedures adopted by Barnes (1971) are germane here. Unfortunately, the use of video cameras in the constraints operating in the gymnasium where teaching took place made it difficult for each group of pupils to be studied because the camera followed the teacher. On another occasion a future investigator might profitably study small collaborative groups to see whether the social and personal development aspirations inherent in the CLR approach were or were not nurtured, an aspect which in the present research was only scrutinized through critical events and case studies.

#### Conclusion

This paper began by implying that the pressure to change traditional processes of teaching was largely precipitated by a knowledge that the image of physical education teachers was uncomplimentary and research showed they used a limited range of teaching styles. In the light of this, if the physical education curriculum is going to make significant changes in harmony with, rather than in opposition to, other mainstream school subjects, then action-oriented

research and development is an essential prerequisite. The writer has, therefore, attempted to make a small theoretical and practical contribution in an under-researched field.

This research has attempted to illuminate a number of matters which are of central importance to teachers of physical education. It has been shown that teachers can use resources which allow children to work collaboratively, that they can teach in a style which permits more pupil decision-making and offers more opportunities for social development through activity. There were small but significant gains for the experimental groups in self-concept, though less in gymnastic skills, except for the experimental group CLR(2), which had the advantage of an extra lesson each week.

The implications for both initial and in-service training are that considerable time and effort will need to be spent both developing specially created resources, which permit a subject traditionally taught didactically to develop alternative styles of teaching, and analysing actual processes of teaching if teachers are to change their styles. Otherwise the deeply ingrained tradition described at the beginning of this article will persist; and physical education will run the risk of remaining on the periphery of discussion about central curricular concerns such as the development of the whole person.

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