
Teachers' use of productive and reproductive teaching styles prior to and following the introduction of National Curriculum Physical Education

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Summary

The purpose of this study was to ascertain whether or not the introduction of National Curriculum Physical Education (NCPE) led to a sample of 16 secondary school teachers expanding the range of teaching styles they employed. During the summer term before NCPE was introduced and two years after

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NCPE was implemented, two lessons taught by each teacher were video taped. Lessons were coded with a systematic observation instrument designed to record the percentages of time in which teachers employ each of eight teaching styles. Results indicated that the percentages of time in which teachers used each of the teaching styles before and after the introduction of NCPE were not significantly different. During both summer terms, teachers spent most of their time using more direct styles. Possible reasons for this finding are discussed.

Keywords: National Curriculum, physical education, teaching styles

A central theme running through early National Curriculum Physical Education (NCPE) policy texts was that pupils should be taught to *plan, perform* and *evaluate* movement. Since they believed that British physical education teachers had previously concentrated on improving pupils' performance of activities, a number of scholars (e.g. Goldberger and Howarth, 1993; Mawer, 1993) argued that, following the introduction of NCPE, teachers would need to use a greater range of teaching styles than they had previously. Specifically, it was suggested that teachers would have to shift from the exclusive use of direct, reproductive or teacher-centred styles of teaching to using more indirect, productive or pupil-centred styles, so that they could achieve a variety of objectives in the psychomotor, cognitive and affective domains. For example, writing in the *British Journal of Physical Education*, Mawer (*ibid.*) remarked that:

A range of teaching approaches may be necessary to meet the requirements of the National Curriculum. Examples of the language used [in NCPE policy texts] include 'setting goals', 'exploring and selecting outcomes', 'refining', 'adapting', 'improvising', 'describing', 'comparing and contrasting', 'analysing', 'judging' and 'reviewing'. . . The suggestion is that a variety of approaches are needed that will enable pupils to achieve the wider range of skills, including personal and social, communication, and problem solving (p. 5).

As yet, there has been no research aimed specifically at discovering what influence NCPE has had on teachers' teaching styles. Therefore the purpose of this study was to ascertain whether or not the introduction of NCPE led to a sample of secondary school teachers expanding the range of teaching styles they employed in congruence with the requirements of the new curriculum.

Mosston's spectrum of teaching styles

Like other researchers who have studied teaching styles in physical education in the past 20 years, during this study we drew heavily from the pioneering work of Muska Mosston. The spectrum of teaching styles described by Mosston (Mosston, 1981; Mosston and Ashworth, 1990) is a theoretical framework of different approaches to instruction based on the chain of decision-making which occurs in the teaching-learning process. Within what Mosston terms the 'anatomy of a style', he theorizes that there are three sets of decisions which have to be made during any 'teaching episode'. These are (1) preimpact or planning

decisions, (2) impact or implementation decisions and (3) postimpact or evaluation decisions. Specific teaching styles emerge based on who makes these decisions – the teacher or the pupil.

According to spectrum theory, there are two 'pure' styles of teaching. At one end of the spectrum is a style in which the teacher makes all the decisions, and at the other end is a style in which the pupils make all the decisions. To date, in between these two styles, nine 'landmark styles' have been identified. Each of these styles has its own decision-making anatomy, and therefore provides a unique set of conditions under which both teachers and pupils operate. Different landmark styles are thus thought to realize different learning objectives and lead to what Mosston refers to as different 'developmental effects' on pupils. These effects can be categorized as cognitive, affective or psychomotor and are hypothesized as promoting physical, social, emotional, cognitive and moral development.

Mosston identifies two clusters of landmark styles. The styles in the first cluster are referred to as *reproductive styles* because, in each style, pupils are expected to reproduce information or skills given to them or demonstrated by the teacher. Conversely, the styles in the second cluster are referred to as *productive styles* because pupils are expected to produce knowledge or skills with which they were previously unfamiliar. Styles in the productive cluster are also frequently referred to as 'discovery' or 'problem-solving' due to the nature of the cognitive processes in which pupils engage when they are taught by these styles.

Finally, in addition to landmark styles, Mosston suggests that there are an infinite number of 'non-landmark' teaching styles along the spectrum. Each of these styles also has a unique decision-making structure. Analysis of a non-landmark style's anatomy therefore enables its approximate position on the spectrum to be located. For the purposes of classification, these non-landmark styles are described as 'falling under the canopy' of the nearest landmark style.

Method

Participants and setting

Sixteen physical education teachers working in the five state secondary schools of one rural south-western English town agreed to take part in the study. Seven teachers were female and nine were male. Their teaching experience ranged from 20 years to nine months.

Data collection procedures

Two lessons of each teacher's choice taught to pupils in Years 7, 8 and 9 were video taped during the summer term before NCPE was implemented, and during the summer term two years after NCPE was introduced. Lessons selected by the teachers were aimed at teaching typical summer activities including track and field, tennis, cricket, softball, rounders and swimming. Teachers wore a wireless microphone to ensure that all of their verbal behaviour was recorded.

Mean class size during the pre-NCPE summer term was 18.53 pupils (SD = 6.38) and mean lesson length was 44.07 minutes (SD = 11.08). Mean class size during the post-NCPE summer term was 21.37 pupils (SD = 12.12) and mean lesson length was 46.03 minutes (SD = 8.89).

Systematic observation instrument

Lessons were coded with the systematic observation instrument known as the *Instrument for Identifying Teaching Styles* (IFITS: Hasty, 1997). IFITS is an interval recording instrument designed to estimate how much time teachers use each of eight teaching styles originally identified by Mosston (1981).¹ The first five of these styles (style A (command), style B (practice), style C (reciprocal), style D (self-check) and style E (inclusion)) are reproductive styles. The final three styles (style F (guided discovery), style G (divergent) and style H (going beyond)) are productive styles. When teachers are not using one of the teaching styles, they are involved in some type of managerial activity, therefore a ninth category, management, was added to the instrument. Definitions of the eight teaching styles and management, together with examples, are provided in Figure 1.

When observing a lesson, a coder using IFITS makes a decision every 20 seconds as to which teaching style is being used by the teacher, or whether the teacher is engaged in management. During intervals in which a teaching style is used but in which management also occurs, the teaching style is given preference and recorded. During intervals in which two or more teaching styles are observed, the least didactic style (i.e. the style which is furthest along the spectrum from style A) is given preference and recorded.

Coding and intra-observer reliability

All 64 video taped lessons were coded by the second author. Observer training involved prolonged periods of coding both live and video taped lessons.

The procedure for establishing intra-observer reliability involved the second author coding and recoding a lesson designated as the 'reliability lesson' before the study began. During this reliability check, the second coding of the reliability lesson was compared to the original. Intra-observer agreement was calculated using strict interval-by-interval comparisons. The reliability percentage resulting from this check was 96.

Eight additional intra-observer reliability checks were made in order to check for 'observer drift'. During each check, this involved recoding the reliability lesson and comparing the new coding with the original. Reliability percentages resulting from these checks ranged from 91 to 96.

Once all 64 lessons had been coded, five lessons were randomly selected, recoded and checked against the initial codings. Reliability percentages resulting from these checks ranged from 91 to 94.

Data analysis

Descriptive statistics were computed for the pre- and post-NCPE summer terms. Comparisons of teaching style use during the two summer terms were made by employing 16×2 (teachers \times term) analysis of variance tests with repeated measures on the second factor.

Results

The percentages of intervals in which teachers used each of the eight teaching styles and were engaged in management pre- and post-NCPE are shown in Table

Reproductive styles

Style A (Command) The teacher makes all the decisions. The teacher demonstrates or explains a task for the pupils to emulate, then directs the pupils' practice by giving commands. The pupils react only when told to do so by the teacher. The teacher evaluates pupils' performances in terms of congruence with the prescribed task. *Example:* Pupils 'shadow' the service action demonstrated by the teacher during a tennis lesson

Style B (Practice) The teacher demonstrates or describes a task and the pupils practise the task at their own pace. The teacher provides pupils with performance feedback. *Example:* The teacher demonstrates seam-bowling during a cricket lesson and then circulates giving feedback to pupils as they practise

Style C (Reciprocal) The teacher demonstrates or describes a task. The pupils then practise in pairs. One pupil (the doer) practises, while the other pupil (the observer) evaluates his/her partner's performance and provides feedback based on criteria supplied by the teacher. During the practice phase, the teacher assists the observer while taking care not to take over the observer's role. *Example:* The teacher demonstrates correct discus-throwing technique. During the practice phase, pupils work in pairs and take turns at throwing and providing feedback

Style D (Self-check) The teacher presents a task. Pupils practise at their own pace but are now responsible for analysing their own performances. During practice, the teacher does not provide performance feedback. Instead his/her role is to help pupils hone their self-evaluation skills. *Example:* The teacher demonstrates correct long-jumping technique. During the practice phase, he/she asks the pupils to evaluate their own performances

Style E (Inclusion) The teacher models a task with several levels of difficulty. At the beginning of the practice phase, the pupils choose the level of difficulty at which they feel most comfortable. During practice, they are encouraged by the teacher to evaluate their own performances and decide when to change to a new level of difficulty. *Example:* The teacher demonstrates high-jumping with the 'straddle' technique and allows the pupils to decide the heights they wish to attempt to clear

Productive styles

Style F (Guided discovery) The teacher asks a series of questions or sets a series of physical problems that when answered or solved lead the pupils to discover a desired skill or concept. *Examples:* (1) During a swimming lesson, the teacher asks a series of questions about water resistance which leads pupils to discover and understand the concept of the streamlined position. (2) The teacher asks the pupils to engage in two conditioned games of tennis, one on a 'long thin' court and one on a 'short fat' court. Pupils are then asked how they can best move their opponents around in these conditions, so that they discover the drop-shot, the lob and the concept of using angles

Style G (Divergent) The teacher asks a question or sets a physical problem to which there are many possible answers or solutions. The pupils then set about finding and evaluating alternative answers and solutions. *Examples:* (1) The teacher provides the class with an assortment of suitable equipment and asks groups of pupils to design their own striking/fielding game. (2) During a track and field lesson, the teacher asks pupils to come up with different strategies that they might try if engaged in a 1,500-metre race

Style H (Going beyond) The pupils identify problems and set about finding and evaluating alternative solutions. The teacher assumes the role of facilitator. This involves providing help when it is asked for and asking questions for clarification. *Example:* During a tennis lesson, pupils are asked to decide which skills or strategies they need to work on, to design and engage in activities which might lead to skill improvement and to evaluate their own performances

Management (M) This is the time the teacher is engaged in activity not directly related to instruction. This includes time spent beginning and ending classes, managing equipment, organising, dealing with pupil behaviour and any other tasks other than instruction or class management. *Example:* The teacher gives out floats to pupils participating in a swimming lesson

FIGURE 1 Definitions of the teaching styles and managerial behaviours coded by the *Instrument for Identifying Teaching Styles*

Source: Definitions of teaching styles are based on descriptions provided by Jewett and Bain (1985), and the definition of management is based on descriptions provided by Phillips *et al.* (1986).

TABLE 1 Percentage of IFITS intervals for each teaching style and management pre- and post-NCPE

| <i>Teaching style</i> | <i>Pre-NCPE</i> | | <i>Post-NCPE</i> | |
|----------------------------|-----------------|-----------|------------------|-----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Reproductive styles | | | | |
| Style A (Command) | 10.91 | 18.49 | 6.50 | 5.85 |
| Style B (Practice) | 55.31 | 27.93 | 49.65 | 12.09 |
| Style C (Reciprocal) | 1.53 | 3.09 | 2.31 | 4.25 |
| Style D (Self-check) | 0.00 | 0.00 | 0.90 | 3.62 |
| Style E (Inclusion) | 2.03 | 8.12 | 1.31 | 3.44 |
| Total reproductive | 69.78 | 21.28 | 60.68 | 11.02 |
| Productive styles | | | | |
| Style F (Guided discovery) | 5.37 | 2.97 | 5.47 | 3.81 |
| Style G (Divergent) | 6.53 | 15.89 | 3.34 | 8.41 |
| Style H (Going beyond) | 0.00 | 0.00 | 0.00 | 0.00 |
| Total productive | 11.90 | 17.22 | 8.81 | 7.85 |
| Management | 18.44 | 8.34 | 29.97 | 5.73 |

1. The analysis of variance tests indicated that the percentages of lesson time in which teachers employed each of the eight teaching styles did not differ significantly pre- and post-NCPE. However, the percentage of time in which teachers engaged in managerial activity was significantly greater following the introduction of NCPE ($F(1, 15) = 12.32, p < 0.05$).

Examination of the descriptive data indicates that the pattern of teaching style use by this sample of teachers was very similar before and after the introduction of NCPE. During both summer terms, teachers spent the majority of their instructional time employing reproductive styles of teaching. In contrast, productive styles of teaching were used relatively infrequently. Teachers spent most time using the practice and command styles. They used the reciprocal, self-check, inclusion, guided discovery and divergent styles comparatively rarely both before and after NCPE was implemented, while they did not employ the going beyond style at all.

Discussion and conclusions

The most important finding of this study was that it indicated that the introduction of NCPE had had little or no influence on teachers' use of different teaching styles. In contrast, the study did indicate that teachers increased the amount of time they spent managing their pupils following the introduction of NCPE. Teachers' managerial systems consist of rules for pupil behaviour, routines by which managerial tasks are carried out and expectations for pupil performance (Fink and Siedentop, 1989). We hypothesize that the teachers may have altered their managerial systems following the introduction of the new curriculum and that implementing these new systems involved the use of additional time.

Both before and after NCPE was implemented, the predominant teaching style employed by the teachers was the practice style. This finding is congruent with the bulk of descriptive research on the spectrum which indicates that, regardless of setting, location and activity, physical education teachers favour the practice

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style (Goldberger and Howarth, 1993). Since the practice style has been shown to be particularly effective when the goal is to teach sports skills (Goldberger and Gerney, 1986, 1990; Goldberger, Gerney and Chamberlain, 1982), this finding also suggests that these teachers remained almost exclusively committed to developing their pupils' performances.

The present study also indicates that teachers did not employ teaching styles which might improve their pupils' planning or evaluation skills, as NCPE policy texts and physical education pedagogical scholars (Goldberger and Howarth, 1993; Mawer, 1993) had suggested they should. Teaching styles which allow pupils to make more planning (styles F, G and H) and evaluation (styles C, D, E, F, G and H) decisions were used relatively rarely both before and after NCPE was introduced. In addition, the sample of teachers in the present study did not provide pupils with any opportunity to work independently (style H) and rarely differentiated the content of their lessons (style E).

We speculate that a number of factors may have contributed to the finding that teachers did not expand the range of teaching styles they used following the introduction of NCPE. First, we hypothesize that these teachers may not have been trained or encouraged to use a wide range of teaching styles during initial teacher education or inservice courses. Secondly, it may have been that these teachers perceived NCPE to be primarily concerned with changing the content they included in their lessons, their methods of pupil assessment and the ways in which they documented what they taught rather than their instructional behaviours. Thirdly, the fact that the need for a change in teaching styles was only strongly implied rather than explicitly stated in NCPE policy texts may have been critical.

Fourthly, the mode by which the new curriculum was introduced may have negated the chances of teachers making changes in their teaching styles. NCPE is a classic attempt at top-down curriculum change, in that it was designed by a government-appointed working group and imposed through legislation. Critics of this kind of change model argue that teachers' lack of involvement prevents real change from occurring (Kirk, 1990).

Fifthly, it may have been that certain situational constraints prevented teachers from expanding the range of teaching styles they used even though they wished to. For example, research conducted by Evans and Penney (1993) indicated that physical education teachers in one local education authority were severely constrained by the lack of time allocated for NCPE. If this was also the case in the schools involved in the present study, perhaps teachers simply did not have the time to experiment with alternative teaching styles?

There is an urgent need to conduct more studies which describe teachers' use of different teaching styles in order to ascertain whether or not the results of the present investigation generalize to other activities, times of the year, year groups and areas of the country. For example, it might be that studies indicate that while teachers employ a narrow range of reproductive styles when teaching summer activities to Years 7, 8 and 9, they employ a much broader range of styles when teaching winter team games, dance, gymnastics, and outdoor and adventurous activities to pupils in Years 10 and 11. Finally, if the results of the present study are found to generalize, there will be a need to conduct qualitative studies aimed at discovering why teachers have not expanded the range of teaching styles they employ. The five speculative hypotheses put forward in this paper might be a starting-point for those who undertake this work. Such additional descriptive and qualitative studies would obviously be of use to those making policy decisions regarding initial teacher education and inservice training.

Note

- 1 As alluded to earlier in the paper, more recently Mosston and Ashworth (1990) have identified three more productive styles of teaching, essentially by dividing the components of the styles we identify in the present study as guided discovery, divergent and going beyond. However, since our preliminary review of the video taped lessons revealed that teachers had used productive styles of teaching infrequently, we decided not to code lessons for these newer productive styles.

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