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in Education**

2004 Report: ICT in schools – the impact of government initiatives

Secondary physical education

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Introduction

This report is based on subject-specific evidence from visits to secondary schools made as part of the inspection of the impact of government ICT initiatives between April 2002 and December 2003 and has been supplemented by evidence from other school visits where appropriate. This contributed to the main report, *ICT in schools*, which is available from the Ofsted publications centre (07002 637833) or via the Ofsted website (www.ofsted.gov.uk).

Main findings

- Over a third of the physical education (PE) departments visited are better placed to sustain and develop ICT use in subject teaching as a result of New Opportunities Fund (NOF) training. Other national, regional and local initiatives have had a greater impact on developing teachers' competence and improving the use of ICT in teaching.
- The contribution of ICT to raising pupils' achievements in PE remains too variable. In almost a quarter of the schools visited, the use of ICT has had a positive impact; in almost a third of schools its use remains unsatisfactory. Improvement is more marked at Key Stage 4 than Key Stage 3.
- In a quarter of schools, the quality of teaching using ICT is good or very good. It is unsatisfactory in a third of schools. The use of ICT at Key Stage 3 continues to be too limited in the majority of schools.
- Planning for pupils to use ICT to enhance learning in PE is rarely systematic in either units of work or lesson plans.
- Leadership of ICT in PE is good in just over a third of departments and unsatisfactory in a third. The evaluation and monitoring of the effects of ICT on teaching and learning in PE by heads of department are the weakest parts of their leadership.
- Although the majority of schools have improved their specialist computer facilities, access remains a problem for many PE departments.
- A significant minority of schools is developing high-quality digital video and feedback facilities which have a significant impact on pupils' progress.

The impact of the initiatives

Teaching and learning in physical education

In a quarter of schools, the quality of teaching using ICT is good or very good. It is unsatisfactory in a third of schools. This is slightly more than reported in section 10 inspections, where the use of ICT was unsatisfactory in a fifth of departments. The use

of ICT to enhance teaching and learning at Key Stage 3 continues to be too limited in most schools.

The majority of PE teachers are competent in their use of computers and are familiar with generic software and applications. There is, for example, an increasing use of word processing to write schemes of work, prepare team sheets, work sheets and spreadsheets for data-logging. In some schools, these are placed on the intranet for use by staff and pupils. There is also an increasing use by teachers, and some pupils, of multimedia presentation software when preparing teaching materials for GCSE and A-level lessons. The quality of display material is improving as digital photographs of pupils' work in different activities are displayed on notice boards and, in a few cases, used in work sheets. Where schools have electronic news boards, PE departments use them effectively to inform pupils and teachers about events, fixtures and other newsworthy items.

Many teachers are more confident in using ICT when teaching their examination classes, often encouraged by requirements of the examination syllabus. In particular, teachers are using a range of software to establish closer links between the theoretical and practical aspects of the syllabus.

Subject-specific equipment used to aid pupils' learning includes heart rate and blood pressure monitors to measure the effects of exercise. Together with traditional timers, these instruments are acting as a good source of feedback to pupils about aspects of their physical well-being and development. In one school, for example, the teacher stored the data on a computer and then used it to provide pupils with the opportunity to interrogate the results, hypothesise, make decisions about their work and to plan the next steps in development.

An increasing number of teachers are regularly using video analysis and this is making a significant difference to the overall quality of teaching and learning. This is illustrated in the example below:

A Year 9 dance class working in small groups used the digital camera and the video camera to help pupils analyse and evaluate improvement in their performance. Having completed a warm-up using individual work cards prepared on the computer, they revised and improved individual technique to develop fluency and precision in twisting and circling movements. Afterwards, the class was brought together to look at an album of digital photographs showing the progress in their work over the past three lessons. They took turns in small groups to view the video-recording of the routine they composed the previous week. Together with the teacher, they identified and discussed two aspects of the performance that they would like to improve. At the same time other groups were continuing their practice, using the digital camera and the video camcorder to record their performance as it developed. Music was played in the background to create an appropriate atmosphere for the composition. In introducing the unit of work the teacher had used a video from the previous year of an outstanding General Certificate of Secondary Education (GCSE) group to demonstrate what could be achieved. The pupils were very enthusiastic and there was an industrious atmosphere in the hall. High expectation, efficient handling of the

equipment and attention to detail in learning were characteristics of the very effective learning. The pupils worked with high self-esteem and rapid progress was made.

Although the use of video cameras and/or digital cameras is on the increase in PE lessons at Key Stage 3, it still lags behind its use in examination classes. Such devices are rarely used in core provision at Key Stage 4 and, currently, across both key stages they are used more frequently in dance, gymnastics and indoor games than in the other practical areas.

Teachers' enthusiasm for ICT and their understanding of the benefits of using it, coupled with frequent access to a range of equipment, can work to create exciting learning environments for pupils of all abilities. In these situations, teachers ensure that ICT is used to maintain a good pace of learning and physical activity. In the following example, a department's involvement in a national ICT project motivated it to purchase additional resources to turn the gymnasium into a 'movement lab' where pupils performed and analysed movement using visual imagery.

In a Year 9 lesson, pupils in the lower ability group were developing their trampolining routines. They worked in pairs organised into three groups, each around a trampoline, with a digital camera and playback facility. As one boy worked on the trampoline the other recorded his movements and they observed the replay together, identifying correctly what needed to be improved before moving on to the next stage of learning. During their next bounce on the trampoline, boys worked hard to correct some of the weaknesses noted. The majority of boys worked independently of the teacher, who was able to stand back and observe pupils' performances and intervene as appropriate, checking evaluations were correct and offering additional feedback through questioning that challenged pupils still further. In one instance, the teacher used a pre-recorded image against the image of one of the boys to illustrate a point about the position of the hips in a swivel hip action.

In another school, pupils in Year 7 demonstrated very good routines in the use of PE and ICT equipment, learning very effectively from evaluations of their own performance. In this rare example of pupils' using video analysis in outdoor lessons:

A Year 7 athletics class of boys working in pairs used the digital video camera and running images played through a laptop to help pupils analyse and evaluate improvement in their shot-putting (throwing) action. As the group practised different phases of the shot putt, one pair, working at the end of the row, took turns to record and view the recording of their performances. Each pupil had a turn at throwing and operating the equipment. At the press of a button the thrower was able to see his own performance. The boys were able to identify and discuss two aspects of the performance that they thought needed improving. Occasionally the teacher intervened and checked pupils' evaluation with open-ended questions such as 'why do you think it is the arm action?' or 'what else might Tom need to do if he is to throw further?' At the same time the teacher was monitoring the rest of the group as they collected equipment and changed roles. The pupils were very enthusiastic and there was an industrious atmosphere on the playing field. High expectation, efficient handling of the equipment and attention to detail in learning were characteristics of the very effective learning. Pupils knew the routines for changing with the next pair

and eight pairs of pupils successfully used the equipment. The pupils were confident to work independently and made rapid progress.

These two examples illustrate how teachers can use specialist software to access images, which can be run either as a loop of continuous play or as a series of clips selected by the teacher to help pupils visualise exactly what they are about to learn. Teachers able to use more sophisticated software are exploring a wider range of teaching styles that develop pupils' evaluation skills and engage them more in peer- and self-assessment. This adds pace and purpose to learning, and the use of a wide range of visual images supported by focused feedback is motivating pupils to engage more in the learning process. In these instances, ICT is starting to have a pervasive impact on the way teachers teach and children learn.

The examples above also show how a teacher's knowledge of pupils' expertise in using ICT can be used effectively in PE. This is a rare exception as, too often, teachers have limited knowledge of pupils' prior learning. Consequently they cannot build on this. In practical sessions, the use of ICT sometimes involves unproductive waiting as the teacher records pupils' work, or spends long spells observing sequences of movement without providing guidance. Moreover, there are too many teachers who remain unconvinced and unwilling to embrace ICT at all. Often this is due to limited understanding of the potential contribution ICT could make to improving achievement, but also to weaknesses in resources and access to equipment.

Standards and achievement in physical education

In a quarter of departments, ICT was judged to have a significant impact on raising standards and achievement in PE. In almost a third of schools, the impact was unsatisfactory and it had a detrimental effect on pupils' learning.

The effect of ICT on achievement is most marked at Key Stage 4 and post-16 and in particular in helping pupils to improve their examination coursework. Most students following examination courses are able to use intranet and internet sites to research course-related topics, and are confident in using word-processing facilities to improve the overall presentation of their written work. These opportunities foster independent learning, leading to a better understanding by pupils of the advantages and limitations of websites and how to select and use information best suited to their needs. For example:

Pupils in a Year 10 GCSE group working in the computer suite found their way around a range of websites and used sport-related CD-ROMs to find examples of training methods that would be most effective to use to improve the VO2 max (maximum amount of oxygen that can be taken in and used by the body in one minute). They shared their findings in a plenary, showing an ability to select appropriate examples to illustrate their answers. They drew on this information to provide a written explanation of how they might improve their own aerobic fitness.

Sometimes, however, the work set does not challenge pupils sufficiently, especially the higher attainers, and materials downloaded are not critically analysed by students.

There are also gains from the use of equipment specific to PE, such as heart rate monitors, as in this example:

Year 10 pupils using heart rate monitors in a health-related exercise lesson recorded their heart beat before, during and after a timed run. They shared this information with a partner and compared each other's results, discussing personal differences and measuring the effects of exercise on their heart rate. The monitors enabled pupils to work with personal data collected over a series of weeks and this enhanced the discussion and helped improve their understanding about aspects of their physical well-being. The pupils were able to retrieve and analyse data, using these to set hypotheses for retests as they develop personal health profiles.

Pupils using video analysis improve the accuracy of their movements and often achieve well in observing and analysing skills through the evaluation of their own and others' performances, as in this example:

In PE pupils confidently used the digital camera and the video camcorder to view and record their own work. As a consequence of understanding what to do to improve there has been rapid acceleration in achievement. Knowledge and understanding of fitness and health have improved as a consequence of setting up 'fair testing' and accurate recording of performance data. This information, when stored, has been useful in giving older pupils the opportunity to hypothesise, to make decisions about their work and to plan next steps in development.

Pupils' understanding of movement analysis has improved where ICT is used to apply theoretical knowledge of the body in practical situations, as in this example:

In a Year 11 GCSE lesson, pupils were applying their knowledge of muscles and movement to analyse basic sporting actions using technical terminology. Following a well-focused introduction by the teacher, the lesson began with pupils working outdoors in groups of four, taking it in turns to perform and record a series of actions: star-jump, netball shot, cricket pull-stroke and a soccer shot. As pupils returned to the classroom for the second part of the lesson they were already discussing how their actions differed, beginning to raise questions and answers as to why this might be. As they played back the video-clips, they were checking for accuracy and use of correct terminology of muscle groups. Pupils recorded their observations on the whiteboard. The use of the pupils' own visual images and opportunities to compare and contrast different actions, developed pupils' observation skills and understanding of different muscle groups in a way which could not have been achieved using text books.

This traditional use of video imagery and other more powerful new video resources and performance analysis software is increasing pupils' motivation to learn, improving pupils' evaluation skills and leading to more consistent and accurate performance.

Despite these improvements in the use of ICT to aid pupils' achievements, the gap between the best and worse provision remains unacceptably wide. In too many PE departments there is a lack of awareness of the significant contribution ICT can make to achievement in PE: it is seen as an addition to the curriculum, not an integral part.

Implementation in schools

Leadership and management

Leadership of ICT in PE is good in just over a third of departments and unsatisfactory in a third. Where leadership is good or better, specific development plans for ICT in PE effectively draw on an audit of existing practice and identify key priorities for improvement. At best, these link plans for additional resources with intended improvement in teaching, pupils' achievements, and curriculum and staff development. Too often, however, plans are superficial and rely simply on acquiring resources without a clear rationale for their use in improving pupils' learning.

As reported in 2002, in the majority of schools the use of ICT in PE lessons is often left to individual teachers and is rarely systematically planned into the broader curriculum content and objectives, either in units of work or individual lesson plans.

The evaluation and monitoring of the effects of ICT on standards and the quality of teaching and learning in PE are the weakest parts of management and were unsatisfactory in over half of the departments.

Assessment of PE using ICT is also underdeveloped. However, where departments are systematically using digital imagery to improve pupils' evaluation skills, they are also using the data to discuss and moderate teachers' assessments about the quality of pupils' work and the standards achieved across year groups and phases, as reflected in this example:

The recorded video evidence in dance lessons and data from health-related exercise are stored and used at the end of a unit/year/key stage as part of the assessment of progress in relation to the four aspects of the National Curriculum. The work is also viewed to assist departmental moderation to aid the correct allocation of a level of attainment.

This is also helping to develop teachers' understanding about National Curriculum levels. Almost a half of the schools are recording evidence of pupils' achievement in electronic form. The best are using the data to track pupils, set targets for different classes and groups of pupils.

Characteristics of PE departments with the most effective management include:

- a policy, action plan and review process for developing the use of ICT in PE
- high expectation of teachers to use a range of teaching styles more suited to what they want pupils to learn
- more opportunities for pupils to take responsibility or to evaluate their own or others' work, as an aid to improving performance
- good resources, suitable for pupils across different year groups
- an enthusiastic teacher serving as ICT co-ordinator in the subject.

In some areas, the role of the local education authority's (LEA's) PE adviser has been crucial in using the benefits of NOF-funded training as a catalyst for further developments. This has involved the establishment of a network of leading teachers and schools as a basis for supporting the development of effective subject pedagogy using ICT. For example, in one authority, a national project led by the subject adviser started with six schools and has now become a regional network involving 14 schools. Some secondary schools are working more closely with their local primary schools and using ICT to create opportunities for Key Stage 4 leaders to work with younger pupils.

In a Year 4 lesson, an advanced skills teacher related work in PE to developments in ICT and literacy. During the lesson, digital cameras were effectively used to record pupils' performance and these images were downloaded to a laptop. The pupils used the material to assess their performance and also emailed their inventive invasion games to Year 10 pupils involved in the Community Sports Leaders Award course, who planned to use these games in a 'festival of sport' for all the primary schools in their area.

Staff development

As reported in 2002, much of the initial NOF-funded training for PE teachers was successful in raising teachers' awareness of the potential of ICT and provided a baseline of support, particularly for low-level users. More generally, however, training was judged to be ineffective because it was too generic and did not take sufficient account of teachers' needs and how ICT could best support teaching and learning in PE. It also failed to challenge teachers who were regular users.

In-house training planned and delivered by the schools often proved to be more beneficial for teachers. This helped to improve teachers' personal competence and to develop their understanding of the range of benefits of using ICT to improve pedagogy. Newly qualified teachers also play a significant part in developing more experienced teachers' understanding of the use of ICT. However, in about half of the schools visited, post-NOF support/training was limited, even when the original training failed to meet staff expectations or needs. This is evident in those schools where whole-school planning for ICT is weak, or in PE departments where there is no action planning for using ICT in the teaching of the subject.

Training linked to national and local initiatives has generally been effective. For example, in one local authority, a small number of schools, where teachers with a special interest in using ICT became involved in a specific project developing the use of visual imagery to improve pupils' evaluation and performance skills using commercial software. Training programmes led by software manufacturers and developed by the LEA adviser and other professionals engaged in the project often resulted in well-structured opportunities that developed teachers' understanding of the benefits of the kit and the pedagogical skills required to exploit learning opportunities for pupils.

Resources and accommodation

The vast majority of schools have specialist computer suites for use across the curriculum, although regular use by pupils following examination courses in PE is limited. This is because of the excessive demands from other curricular areas and the failure of subjects to book the facilities in sufficient time limits access time for PE. Most schools make their specialist facilities available before and after school, as well as during the lunch-times, and this provides good opportunities for many pupils. In most schools there are still limitations in the range of specialist software available to pupils in PE.

Most departments have access to a computer for administration and management, with an increasing number linked to the school network. A few departments have managed to get a dedicated classroom for PE and the best of these are well equipped with computers. In one instance, the classroom was directly linked to the fitness suite enabling good links between theory and practice. The extent of a department's resources usually reflects its teachers' commitment to developing and using a whole range of ICT resources and equipment. Despite limited budgets, some departments have developed a good range of equipment, as in the following example:

The department is well provided for and makes effective use of resources for ICT. As well as a computer work station and two laptops, the department has: 1 data projector, 1 televideo, 1 digital camera, 2 digital video camcorders, 2 compact disc players, 3 radio cassette players, 4 electronic heart rate monitors, 1 digital heart rate monitor, 1 pulse rate monitor, 1 blood pressure gauge, 1 body fat gauge, 1 grip strength monitor, CD-ROMs, cassette tapes, compact discs and stopwatches. Resources make a big impact on the quality of work.

The availability and use of video cameras and players are improving as more schools make the purchase of new equipment a priority and others make more use of existing equipment in lessons.

LEAs and departments involved in national projects have used a variety of funding sources to enhance their equipment. Most significantly, some headteachers have supported these projects and invested additional funds to ensure that sufficient resources are available for whole classes. In one school, for example, this enabled the PE department to purchase additional digital cameras linked to playback monitors so that all pupils could use them during a lesson. The resources set up in the gymnasium created the sense of a visual analysis laboratory. In one LEA, the adviser encouraged headteachers to match NOF funds in order to improve equipment. This enabled several local schools to purchase data projectors for the sports hall which complimented the purchase of digital cameras and software.

In a small number of schools, access to specialist technical support is helping PE staff to make more effective use of ICT resources. In one school, for example, the technician records pupils' work on video for subsequent analysis.