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Summary

There is limited research evidence specifically relating to ICT and classroom organisation. However, a number of research projects offer advice on how teachers can plan and manage the use of ICT resources in their classrooms, set alongside broader principles of classroom management.

Key aspects of effective organisation of ICT

- Portable ICT devices can fit a teacher's preferred style of classroom organisation with the minimum of disruption to existing practices
- Digital projectors and interactive whiteboards allow teachers to integrate ICT into their lessons while teaching from the front of the class
- Wireless connectivity enables work with ICT to take place wherever and whenever suits the teacher and learner and improves access

Teachers can maximise the impact of ICT resources by ensuring that they:

- organise their classrooms with more emphasis on whole-class or small group work and differentiated learning when using ICT
- consider how to provide access to ICT resources for all
- locate computers in classroom clusters and ICT suites.

What the research says about ICT and classroom organisation in schools

This report is based on an analysis of current research concerning ICT and classroom organisation in primary and secondary schools. It summarises the key findings and suggests resources for further reading.

What do we mean by classroom organisation?

Classroom organisation in this report is concerned with the physical approaches to teaching with ICT such as the layout of the classroom, the arrangement of the furniture, equipment and students. These practical details need to be managed well to support learning and teaching in a controlled learning environment.

Effective organisation of ICT will ensure that:

- there is appropriate access to ICT resources to meet curriculum demand, including specialist devices for some subjects such as science and appropriate learning aids for students with special needs
- an appropriate range of online content and software is available which is relevant to the needs of the curriculum and different learning styles of the students
- there is equality of access across all abilities
- learners have access to content and communications beyond the classroom.

In some cases it is the organisation of resources rather than the quantity of resources which determines the extent to which ICT is used (Pelgrum, 2001). But to judge which approaches to ICT and classroom organisation are most effective, it is necessary to examine the available research evidence.

Becta
ICT Research

Key Research Evidence about ICT and classroom organisation in schools

On the basis of Becta's analysis, effectively organising ICT can make a significant impact in the areas outlined below (there are references for further reading supplied alongside some of the findings).

General aspects of effective classroom organisation of ICT

- Computers can be used in a range of different ways to improve learning and teaching: by individual pupils, by groups and for whole-class teaching (Higgins, 2003)
- Portable ICT devices do not dominate in the same way desktop computers can, and may be more readily integrated into classroom use and across the curriculum with the minimum of disruption to existing practices (Moseley and Higgins, 1999)
- Lesson routines such as staged entry to classrooms, computer allocation, password and printing procedures improve the working atmosphere in ICT-resourced lessons (Hudson-Davies and Notman, 2001)

About Becta's 'What the Research Says…' series

This series of briefing papers is designed in particular for teachers, ICT co-ordinators and school managers, in order to provide an initial idea of the available research evidence for the use of Information and Communications Technology (ICT) in schools and colleges. We welcome feedback and suggestions for further titles in the series (contact details can be found at the end of this briefing).

Implications for students

- When students work collaboratively in small groups, ICT can be used effectively to support talk and improve discussion (Higgins, 2003)
- ICT can help support inclusive practice through the use of portable computers and communication aids for students with special educational needs
- Whole-class teaching using an interactive whiteboard enables all students to participate
- Students gain fairer access to computers when teachers apply specific routines to manage computer allocation (Hudson-Davies and Notman, 2001)

Implications for schools and teachers

- Interactive whiteboards allow teachers to integrate ICT into their lessons while teaching from the front of the class (Cogill, 2003; Smith, 2001)
- Wireless connectivity enables work with ICT to take place whenever and wherever suits the teacher, leading to improved access to ICT and consequently increased use (Perry, 2002)
- Teachers are more likely to use ICT as part of their teaching when ICT suites are complemented by clusters of computers, ICT rooms in other subject areas and sets of laptops (Ofsted, 2004)
- Teachers experienced in using ICT organise their classes differently to other teachers, with more emphasis on small group work and differentiated learning (Pisapia, 1994)

Factors for effective use

- Deployment of ICT equipment in computer suites and classroom clusters enables teachers to access them easily and integrate them effectively (Fabry and Higgs, 1997; Manternach-Wigans, *et al.*, 1999; Pisapia, 1994)
- Grouping for differentiated activities is more effective if learners have mixed experience of ICT, as experienced learners support the less confident; this also helps less focused learners
- Interactive whiteboards can be used more effectively where they are fixed in one place (Cogill, 2003)
- Wireless laptops reduce many of the organisational difficulties for teachers using ICT in classrooms and across school, owing to their flexibility, convenience, simplicity, low profile, speed, ease of movement and strategic deployment (McKenzie, 2001)

Developing an environment for learning

Staff at Mere Green Combined Primary in Sutton Coldfield are developing a 'learning to learn' culture, where pupils and teachers feel confident enough in their own ICT capabilities to undertake independent learning. The school makes use of software that promotes collaboration across the network and is actively pursuing an approach that tailors teaching to the specific learning styles of individual pupils.

The school planned its ICT suite carefully for infants and primary-aged children, by installing gas lift chairs with smaller seats and footrests to help pupils maintain good posture and eye contact with the monitor, regardless of their size. Temperature and light levels are correctly maintained by air conditioning and variable lighting. There is adequate space for two pupils to work comfortably at one PC, with curved desks that are deep enough to provide workspace and keyboard rests. This set-up encourages dialogue between pupils who are working together but reduces distraction from neighbours.

The suite is divided into separate learning areas. One side is designed for instructional teaching with all pupils facing forward, whilst the other is set up for children working independently in groups, pairs or individually. The teacher can control the class computers remotely without having to intervene directly unless it's necessary. There are also laptops available that link to the network that can be used around the school, on field trips or at home by staff. Space has also been created for staff members to dock their own laptops, allowing them to access records, amend assessments on the fly or upload resources.

The ICT suite is also a shared resource that can be used by the wider community.

More details of this case study can be found on the ICT Advice website at http://www.ictadvice.org.uk (search for Mere Green).

Explanation of findings

As with ICT more generally, positive impacts depend on the ways in which teachers effectively organise and use ICT resources in school. Although the literature is still emerging, there is evidence of good practice and positive outcomes from a number of schools and local education authorities.

ICT suites or clusters in classrooms?

A key factor that affects how teachers use ICT is the location of computers within the school building. Although access to a computer suite allows teachers to use computers with a whole class, they are more likely to use ICT as part of their teaching when they have access to both ICT suites and clusters of computers in their classrooms (Ofsted, 2004).

A number of research studies indicate that schools providing computer access in both computer suites and classrooms can help alleviate timetabling problems caused by dedicated ICT suites. However, allocating the right types of technology in classroom clusters is equally important, as numbers of computers alone do not necessarily ensure adequate access. Indeed, one study (Pelgrum, 2001) found that even in schools with comparatively high numbers of computers, teachers still complained of a lack of equipment (Fabry and Higgs, 1997; Manternach-Wigans, *et al.,* 1999; Pelgrum, 2001; Pisapia, 1994). Conversely, it is worth noting that inadequately resourced classrooms can also lead to a minority of students dominating resources (Selwyn and Bullon, 2000).

Wireless portable devices

The use of portables in conjunction with a wireless network can have a significant impact on classroom organisation and teaching style. Portable devices can be used within classrooms and can more easily fit the teacher's preferred style of classroom organisation. Teachers can act more as facilitators and peer tutoring can become more commonplace – if teachers and students are open to and ready for these developments. The simplicity of setting up and using wireless technologies allows teachers to focus on learning objectives, rather than on the technology itself (McKenzie, 2001; Moseley and Higgins, 1999; Perry, 2002).

Using ICT in group work

There will be times when teachers want to group students for particular purposes (for example, for differentiated activities) to allow experienced computer users to assist the less experienced computer users and separate less focused pupils. Students working in groups of three to five at one computer, create a better distribution of expertise, greater capacity for idea-generating and increased opportunities for cross-gender collaboration. This method of working allows for more time to be spent on non-keyboarding tasks, which is beneficial, as the student at the keyboard appears to do less thinking. Groups should consist of at least one low-ability member to make others explain and understand things more clearly (Eraut, 1995).

Interestingly one research study (Pisapia, 1994) noted teachers experienced in using ICT organised their classes differently to other teachers, with more emphasis on small group work.

Learners with special educational needs

Lessons need to be designed so that learners with disabilities or learning difficulties can be fully included in classrooms. The ability to communicate ideas to other pupils, to work on similar tasks and not be located at the edge of a group or class because of the location of a computer, highlights the need for good classroom organisation of ICT resources.

Teachers' perceptions of ICT

Teachers' approaches to how they plan and deliver lessons using ICT can be affected by their prior knowledge, values and beliefs concerning the role of technology in education (Cox and Webb, 2004). For example, teachers who prefer a teacher-centred approach to their classroom organisation have had difficulty in using ICT because it is often perceived to demand a student-centred approach (Scrimshaw, 2004). However, the growing use of interactive whiteboards as a whole-class resource has enabled teachers to make use of ICT without making changes to their preferred teaching methods (Cogill, 2003).

Key questions for schools

- Do teachers have access to ICT resources in ICT suites and classroom clusters?
- Are teachers well informed about using computers effectively with groups of students?
- Are ICT resources deployed so as to enable teachers to access them easily and integrate them effectively?
- Have the practical issues of location, positioning and health and safety been considered?

About the research literature

Given that educational practitioners are still developing strategies and modifying their pedagogy as a result of the introduction of ICT, it is not surprising that there is relatively little academic research on classroom organisation for effective use of ICT. However, there are a number of research projects that have been undertaken by schools and local education authorities, providing advice on how teachers can plan and manage the use of ICT resources in their classrooms, set alongside the broader principles of classroom management.

The majority of findings are taken from research papers from the UK and USA that focus on teaching and learning, barriers to the effective use of technology in education and the effects of interactive technologies on pedagogy, rather than from dedicated research on ICT and classroom organisation.

Key areas for further research

As more educational practitioners begin to embed ICT in their classrooms, more research is needed on ICT and classroom organisation as a topic in its own right.

The potential mobility of learning that may result from portable devices being given to students for their own use, and that can be taken out of the classroom or traditional learning context, raises a host of classroom management issues.

More research is needed to identify how teachers can effectively organise the way they and their students use interactive technologies, as they become embedded in classroom practice.

Current research and professional development

The ICT Test bed project is being funded for four years to examine how effective use of ICT can help raise achievement. The ICT Test Bed evaluation (April 2003 to December 2006) will track the effects of high levels of technology on five key areas of work in schools and colleges. [See http://www.dfes.gov.uk/ictinschools/ict_active/subject.cfm?articleid=474]

Hands on Support (HOS) aims to provide teachers with face-to-face support, in their own classroom environment, on an individually focused, specialist to specialist basis, in the effective use of ICT in teaching and learning. [See http://www.dfes.gov.uk/ictinschools/ict_teaching/document.cfm?articleid=304]

Becta has published learning support materials to help teachers learn more about specific issues in ICT suite design, including the arrangement of desks and working positions for students using ICT suites. [See http://ipas.ngfl.gov.uk/ilr/ics/htm/ICT_ABT_3.html]

Bibliography and further reading

The research referred to in this briefing represents a selection of ICT research related to ICT and classroom organisation, and should not be regarded as a definitive list of the 'most important' research in this area.

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This briefing and others in the 'What the Research Says' series can be found on the Becta Research web site at: **www.becta.org.uk/research**

Becta's ICT Research Network

If you're interested in research on the use of ICT in education, you can join Becta's ICT Research Network.

The ICT Research Network seeks to encourage the exchange of information in order to inform the national agenda and professional practice.

Membership is free and is open to:

- teachers
- ICT advisors
- researchers
- research sponsors
- ICT co-ordinators
- school managers
- policy makers
- industry.

The Network provides them with an opportunity to:

- exchange information on current research
- develop partnerships
- discuss priorities for further investigation
- focus research on issues of importance to practitioners and policy makers.

They can do this via:

- an email discussion list
- publications
- conferences and events.

More information on Becta's ICT Research Network can be found at **www.becta.org.uk/research/ictrn**

Alternatively, send an email to ictrn@becta.org.uk or write to Michael Harris, ICT Research Network, Becta, Millburn Hill Road, Science Park, Coventry CV4 7JJ.

About Becta

Becta is the Government's lead agency for information and communications technology (ICT) in education and supports UK Government, national organisations, schools and colleges in the use and development of ICT in education to raise standards, widen access, improve skills and encourage effective management.

About the ICT in Schools Programme

The ICT in Schools Programme is the Government's key initiative to stimulate and support the use of information and communications technology (ICT) to improve standards and to encourage new ways of teaching and learning. The enormous potential of ICT means that for the first time it is becoming possible for each child to be educated in a way and at a pace which suits them, recognising that each is different, with different abilities, interests and needs. The challenge over the next four years will be to successfully embed ICT in every facet of teaching and learning where it can directly impact on raising standards of attainment. A vision for the future of ICT in schools can be found in the paper *Fulfilling the Potential – Transforming Teaching and Learning through ICT in Schools*, available on the DfES ICT in Schools website [**http://www.dfes.gov.uk/ictinschools/publications/**].

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