

The Motivational Effect of ICT on Pupils

Emerging Findings¹, December 2003

Background

This study, commissioned by the Department for Education and Skills (DfES), was designed to investigate the effects of information and communication technologies (ICT) on pupil motivation. The aims were to examine impacts of ICT on motivation and related issues such as learning outcomes, behaviour, school attendance and to quantify any impacts where possible. The study also set out to consider the ways in which ICT can best be used by teachers to enhance motivational impacts for pupils, especially for those disaffected with traditional forms of learning.

A sample of 17 schools from across England, which had been identified as using ICT in motivational ways, was selected for detailed study. A range of research methods was adopted, including a large quantitative survey of pupils. It was the intention that learning was considered within a wider social and community context as well as in an educational context. Evidence was therefore gathered from sources within social and community settings as well as within schools.

Key emerging findings

The study found that in the case study schools:

- Overall the motivational impact of ICT was positive. However the circumstances and ways in which ICT was used affected the outcomes.
- The forms of motivation which arose as a result of ICT use were concerned with a commitment to learn, more than with a mere completion of tasks or to gain a competitive edge. This was more the case with primary pupils than secondary pupils, but true of both groups.
- ICT had a positive motivational impact on the following learning processes:
 - engagement (through visual, kinaesthetic and auditory means);
 - research (access to a wide range of resources from which to search and select);
 - writing and editing (through offering pupils ways to commit ideas more readily and edit to far greater extents than before) and;
 - presentation (through enabling them to present work neatly and professionally).
- The types of ICT that pupils found particularly useful were: the Internet, interactive whiteboards, writing and publishing software and presentational software.
- There was evidence that ICT impacted positively on pupils' attitudes towards and engagement with their school work and some evidence from pupils and school staff that behaviour in class was better when ICT was used.
- Through improving motivation, ICT impacted on the quality of pupils' work, but for potential attainment outcomes to be fully realised, ICT needs to be used to support subject learning, that is, to impact on pupils' subject-specific learning processes, rather than just addressing issues relating to engagement and presentation of work.

Methodology

Seventeen case study schools from across England were selected on the recommendation of external observers including Becta, Ofsted and LEAs, as representing good practice in the use of ICT.

¹ A full report of the study will be published in the ICT in Schools Research and Evaluation Series in Spring 2004.

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The sample was selected in order to be broadly representative of school phases and types, geographical locations, socio-economic and ethnic backgrounds of pupils and ICT facilities deployed. The study involved quantitative and qualitative methods of data collection in the 17 case study schools (5 primary, 8 secondary, 2 special schools and 2 PRUs) during Spring and Summer terms in 2003. Interviews were undertaken with a total of 121 head teachers, teachers and classroom learning assistants, 126 pupils, 22 parents, and 24 youth and community workers,

health workers, careers officers and police officers. Questionnaires were completed by 1206 pupils on their attitudes to school, learning and motivation.

Observations were undertaken of 33 classes and documentary evidence was collected on pupil attendance, behaviour and attainment records.

The study did not attempt to compare schools which made use of ICT to those which did not. Instead the approach taken offers ways of considering motivational profiles that arise in the sample schools, all of which were chosen as exemplars of good ICT practice.

Literature review and theoretical framework

Although there were many references in the research literature to ICT having a positive effect on pupil motivation, few studies had specifically looked at the topic in detail and many of those that had were small scale. Motivation was often described in general terms and none of the identified studies related their outcomes to a conceptual framework to allow the nature of motivation to be identified in more exact terms.

Motivation was conceived in this study in terms of eight different measures, which draw upon current motivational theory. Most are concerned with the reasons that pupils have for engaging in tasks in a school context, and for this study were particularly related to engaging in tasks using ICT. The measures were as follows in Figure 1.

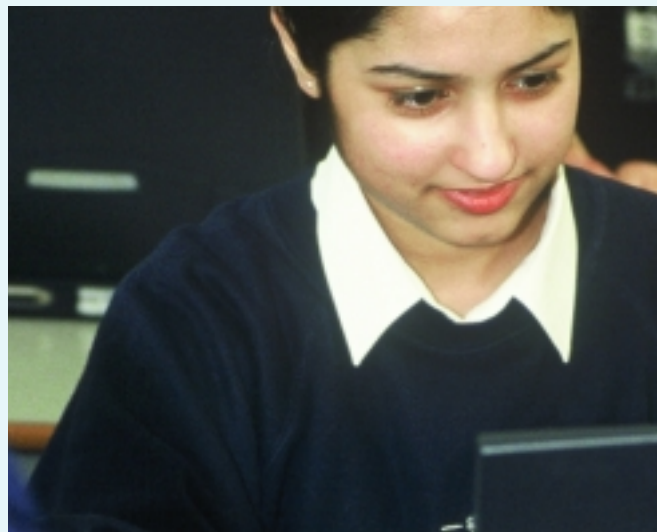


Figure 1: Definitions of motivational measures used in the study

MOTIVATIONAL MEASURE	DEFINITION	IDEAL 'POSITIVE' LEARNING PROFILE
Learning goal	The reason for engaging in the activity using ICT is to further personal understanding and competence	High level
Performance approach goal	The reason for engaging in the activity using ICT is the pursuit of opportunities to gain positive feedback about one's competence	Low level
Performance avoidance goal	The aim of engaging in the activity using ICT is to avoid feedback suggesting a lack of competence, often achieved by finding ways of not engaging in the task	Low level
Academic efficacy	The degree to which an individual believes they have the capacity to design and execute the courses of action necessary to achieve a particular goal using ICT	High level
Intrinsic motivation	The degree to which ICT directly engages the pupil and holds their interest	High level
External regulation	A willingness to engage in work with ICT because one feels obliged to do so by someone else, probably an authority figure such as a teacher	Low level
Identified regulation	Beginning to recognise and share the values that might have been assumed to drive the inducements offered by others to engage in the task using ICT	High level
Amotivation	A lack of any particular reason for engaging with ICT-supported work	Low level

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This framework translated into measures of motivation which formed the basis of the pupil questionnaire. Pupils were asked to reflect on recent experiences of using ICT in class and to answer questions about their experience, which represented scales corresponding to each of the eight motivational measures, above. The relative strengths of the different type of measure were then analysed to draw conclusions about the types of motivation arising from ICT use.

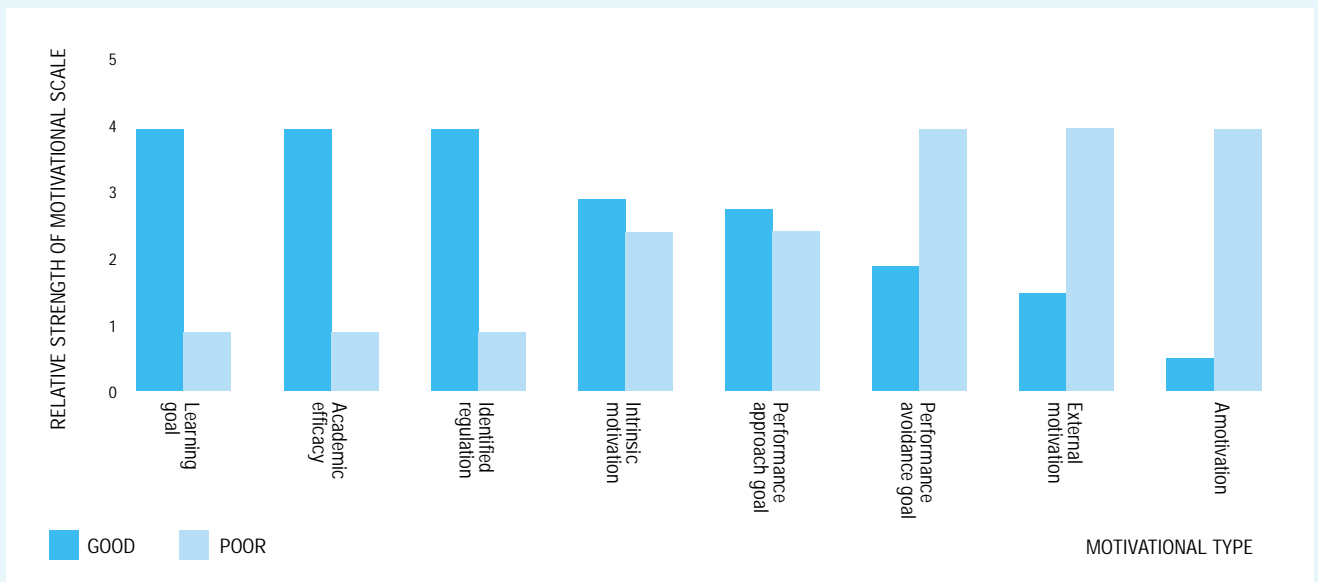
The ideal learning profile (illustrated in Figure 2 below) provides an indication only, as different motivational profiles may well be suited to different activities and in different situations. For example high levels of performance approach goals (the pursuit of positive feedback on personal performance) may be good in an exam situation, but not necessarily good in a class

discussion of mathematical strategies to solve problems, where it may result in over-competitiveness.

Failure to match the 'ideal' profile should not be taken as a sign of great concern; it is the relative strength of particular measures in the profile that is important. Performance approach goals, for example, can act as powerful motivators that will enhance learning, so high levels are not necessarily a problem. Overall, however, it is better to have stronger learning goals.

Among other things, this approach allows an understanding of the balance between 'intrinsic' motivation (i.e. the use of ICT in itself is motivating), and other motivational measures. This is important to understanding whether using ICT in school impacts in direct ways, which may be short-lived or in ways more deeply linked to learning processes.

Figure 2: Hypothetical 'good' and 'poor' motivated profiles.



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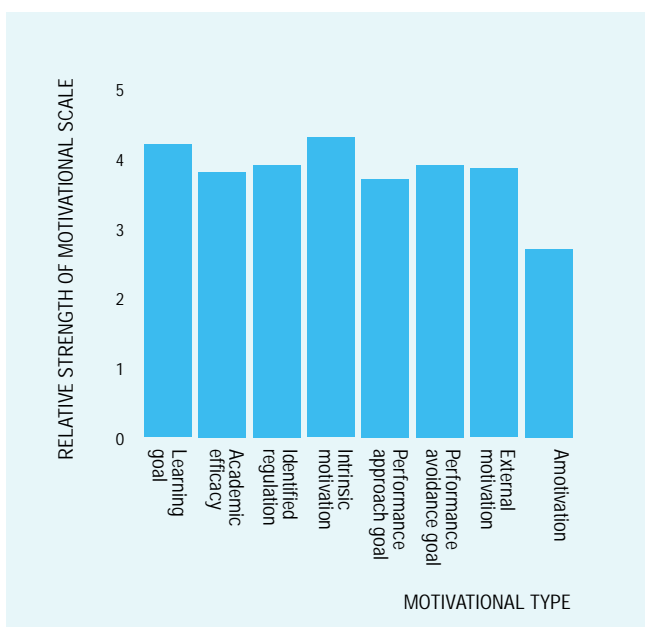
Findings

Impacts upon learning and learning environments

Figures 3 and 4 below demonstrate the profiles of primary and secondary pupils based on their responses to the questionnaires about using ICT in class. By comparing these profiles to the hypothetical motivational profiles presented in figure 2, it can be seen that the overall balance of the motivational impact of ICT upon pupils identified in this study was positive.

The charts indicate that the forms of motivation that arose from ICT use were more related to a commitment to learning than a means to complete tasks or to gain a competitive edge in school. The pattern was stronger for primary pupils than secondary pupils, but true of both. This is shown in figure 3 for primary pupils and figure 4 for secondary pupils by relatively higher levels of learning goals and academic efficacy and lower levels of performance approach and performance avoidance goals.

Figure 3: Motivational profiles of primary pupils in the study



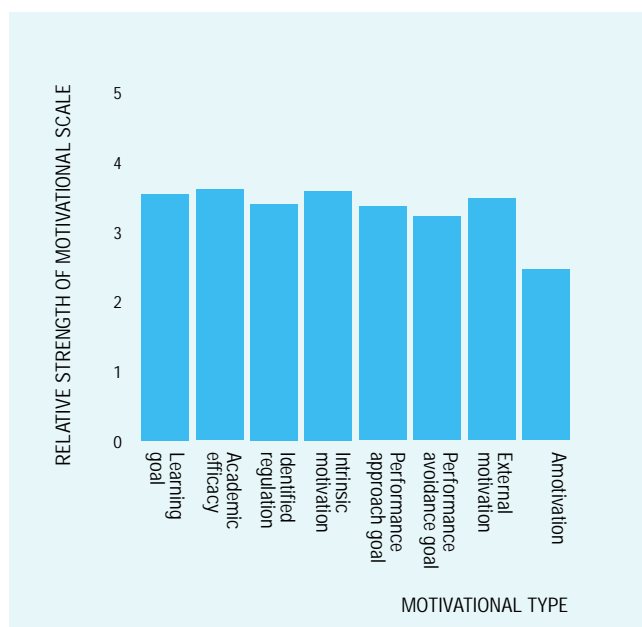
At primary level, the intrinsic motivation of ICT was also high, that is the use of ICT was motivating in its own right, but this was not a problem because it was not at the cost of learning goals, or other key measures such as academic efficacy (a pupil's confidence that they could achieve their goal).

Regarding pupils' academic efficacy (their confidence in their ability to achieve particular goals), ICT allowed pupils with different backgrounds to view success, by enabling them to see end points that they could work towards in order to complete tasks. This was dependent however on appropriate direction, support and guidance from teachers.

The qualitative findings suggest that communication aspects of ICT were important to certain groups, such as those who are disabled, and those 'at risk' of disaffection (for example at risk emotionally, behaviourally, or socially). The information aspects of ICT were found to be important to other groups, such as the gifted and talented. However, there was evidence from professionals who worked with pupils that those benefiting initially from the communication aspects of ICT, could move on at appropriate times to embrace information as well as communication uses.

There were indications that the overall motivational impact was greatest where there was a focus on the

Figure 4: Motivational profile of secondary pupils in the study



use of ICT in both teaching and learning (e.g. clusters of computers to support subject learning and interactive whiteboards to support teaching and learning).

Teachers and pupils across primary and secondary sectors reported that ICT had a motivational impact on the following learning processes:

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- Engagement - visual, kinaesthetic and auditory forms of ICT engage pupils.
- Research - ICT provides the opportunity to search and select from much wider ranges of resources than before.
- Writing and editing - ICT offers pupils ways to commit ideas more readily and widely and enables editing to far greater extents than before.
- Presentation - ICT enables pupils to present work well, no matter what limitations they had with pen and paper.



Attitudes towards school work

Almost all of the primary teachers interviewed felt that ICT had a positive impact on pupils' interest in and attitudes towards their school work. Teachers reported that ICT use led to higher levels of pupil engagement in learning activities, pupils were more responsive (both to them and to other pupils), remained on task for longer and worked more independently. Consequently they felt that pupils were learning more. All of the primary school pupils interviewed said that ICT made lessons more interesting, because it allowed them to play games, to hear and see things better and to be able to move things around.

All of the secondary school teachers interviewed felt that ICT had a positive impact on pupils' attitudes to their school work. Teachers felt that ICT helped them to take pride in their work, supported their research and made it more likely that tasks would be completed and handed in on time. Some teachers felt that sometimes, although pupils' interest was stimulated, content of learning was not improved. Most secondary pupils interviewed reported that they felt ICT made lessons more interesting because learning potential was enhanced e.g. through using the Internet, experimenting and changing things, and by allowing pupils to better express themselves. Some pupils however found it frustrating when the technology went wrong, so their interest levels were dependent upon the reliability and functionality of the ICT.

Quality of work and attainment

Teachers widely reported that ICT was motivational because it enabled pupils to make improvements to the quality of their work in terms of writing, appearance and presentation. In some cases improved quality of work in a subject was more fundamentally identified, such as within Design and Technology where ICT was believed to impact directly on the processes involved in learning. Where ICT was fully embedded in subject teaching (as was the case with Design and Technology, in four schools at least) there appeared to be indications of a related positive impact on pupil attainment at GCSE.

Without exception, all pupils who were interviewed felt that the quality of their work was improved when they used ICT, generally because of the associated

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improvements to spelling, grammar, editing and appearance of work. Most secondary school pupils felt that ICT was helping them to get better marks, but this was specific to certain aspects of their work, such as presentation rather than to overall enhancements in all aspects of the subject. In Years 10-13 pupils indicated that ICT enabled them to undertake coursework more easily, to redraft, to be more creative and to work faster and more neatly.

The role of ICT in target setting was reported by some teachers as an important motivator for pupils to attain higher marks. One teacher said that as a result of recording and sharing coursework marks electronically, pupils always tried to improve on their past grades. Many head teachers and teachers reported that ICT enabled them to have higher expectations of the pupils and for pupils to have higher expectations of themselves.

Behaviour and attendance

All head teachers interviewed believed that ICT had a positive effect on behaviour in lessons, because its use made pupils more committed to the learning task, allowed them to feel more in control and able to achieve more professional outputs. Teachers felt that ICT led pupils to be more focused and less distracted in lessons. Two thirds of secondary school pupils reported that other pupils behaviour in lessons was better when ICT was used and only a few pupils stated that it was worse. Those who indicated that ICT had a neutral or negative impact on behaviour qualified this by saying that the teacher had an important role to play.

A number of pupils reported that ICT impacted positively upon behaviour outside school, for example use of Internet and email encouraged more positive activities, longer engagement with school work, deeper and wider discussion with a broader group of friends, and a sharing of emotions through chatting. These forms of positive impact were supported by reports from youth and community workers, and police officers. However, not all professionals were aware of the ways in which ICT could be used effectively to support groups of young people. ICT did not appear to be extensively used to link groups that could together offer more effective support to young people, particularly those groups who work with young people at risk.

Some examples of partnerships were identified in this research, such as improved communications between educational welfare officers and schools, the police and schools and between careers officers and schools. However there appears to be an opportunity for much wider development in this area.

Apart from the use of computerised attendance systems, which had led to increased attendance in the two schools in the study that had introduced them, most teachers and head teachers did not feel that using ICT in lessons had impacted on attendance. However, some secondary pupils reported that ICT did have a positive effect upon their attendance or the attendance of others.



Specific technologies and resources

The specific resources that pupils felt helped them the most were the Internet (largely for research purposes), interactive whiteboards (for visual, auditory and kinaesthetic reasons), writing and publishing software (for writing and editing purposes) and presentational software. Some pupils could discern between the ways that these different forms of ICT supported their learning; for example interactive whiteboards were recognised to support what and how to learn and direct uses of generic applications on computers were recognised to support processes such as writing and editing.

Where used effectively, interactive whiteboards were felt by teachers and pupils to be particularly motivating (for both teachers and learners). The features of interactive whiteboards that appeared to lead to motivational impact were concerned with presentational

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aspects (that allow items to be flashed up, or items to be completed), annotation effects, and direct interaction through touch. From a teaching point of view, teachers could use interactive whiteboards to deliver to a whole class, use the digital content that was available to them, easily review aspects previously covered, and increase the pace of lessons to the extent that pupils were aware of and responded to this increased pace.

Secondary school pupils reported that the subjects where ICT helped them the most were: Design and Technology where ICT was used for research, writing, design, production, presentation and evaluation; English for writing and editing; and mathematics because of the visual opportunities afforded through interactive whiteboards, and for use of specific software such as spreadsheets. The most commonly reported reason for feeling that the ICT was helpful, was that its visual nature enhanced understanding (particularly through the use of moving imagery and animations). By comparison, pupils said that using ICT simply to type up work did not seem particularly helpful (as opposed to more enriched presentational and editing uses).

Primary / Secondary

Broadly similar patterns of motivation for ICT-based learning were found in both the primary and secondary sectors. As would have been expected from the general literature on motivation in schools, primary pupils had somewhat more positive motivational profiles than secondary pupils.

For primary pupils, the pattern of motivation showed that when using ICT, learning goals were much more important than performance goals and this indicates that classrooms were clearly seen to be focused on learning. Pupils were typically neither just working because they had to, nor because they were stimulated by the ICT use itself. They were showing an encouraging tendency to develop a set of values that stressed the importance of learning per se and where they saw the learning activities (rather than simply the use of ICT) as being something to which they attached a personal value. At the primary level there were few influences on motivation from other factors. The school attended, gender, year of study, language spoken at home, and the presence of a home computer made no difference to the motivational scores.


At the secondary level, these factors played a more important role. The level of performance avoidance



motivation (that is avoidance of critical feedback on performance and avoidance of difficult tasks), declined with age from Year 7 through to Year 10. This decline is contrary to generally observed trends and suggests that use of ICT has had positive developmental effects on pupils in these schools. Identified regulation (seeing learning tasks as being important) increased and levels of amotivation (not having a good reason to engage with learning tasks) decreased with age. Taken overall, the age-related differences found within the secondary sector suggest that ICT engages pupils more as they get older, and so has a positive impact on motivation.

Gender

The evidence suggests that using ICT had a motivational impact both upon boys and girls. Secondary school teachers indicated that boys were more motivated by the use of ICT initially, but that overall there was not a great deal of difference by gender. From the pupil questionnaire evidence there were relatively small gender differences. When these were studied, however, boys tended to demonstrate stronger motivational profiles. This implies that the use of ICT probably has a greater positive effect on boys, whilst at the same time not disadvantaging girls.



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This may well be explained by the fact that boys are traditionally thought to work often in 'burst' patterns, while girls work in more 'persistent' patterns. ICT may enable boys to shift in their approaches from 'burst' patterns to more 'persistent' patterns. This being the case, ICT would not, of course, disadvantage girls. Teachers recognised and described this pattern of shift in terms of the impact of ICT upon project and coursework in almost all subject areas, and the impact of presentational software upon talks and presentations that pupils put together across all age ranges.

Disaffected pupils

There was evidence that ICT, used appropriately, can help to motivate pupils who are disaffected. The majority of secondary school teachers felt that pupils who were disaffected in some way (or who were at risk of being disaffected) could be supported through the use of ICT. ICT was seen to be an effective means of supporting pupils in PRUs. For example through art projects which engaged groups of pupils with ICT in the form of video and digital cameras, image manipulation and creation. Another example involved the use of ICT in the form of computer suite access and interactive whiteboards to enhance engagement, creating more positive behavioural environments. Youth workers and educational welfare officers reported examples of how ICT was being used to support young people at risk. On-site and on-line support in centres has been vital to the success of ICT in a range of these situations. Primary and secondary teachers and police officers

believed that disaffection was often related to a lack of ability to write and read. It was suggested therefore that effective use of ICT could support the development of literacy skills of pupils in primary school and in so doing, reduce disaffection and potentially anti-social behaviour and crime at later stages.

Gifted and talented pupils

According to reports from both teachers and pupils, the forms of ICT that tended to be of most recognised value to gifted and talented pupils were concerned with information aspects, rather than communication aspects. Access to digital content and to resources from the Internet, for example, was seen as a real benefit for this group, and a benefit that could not only extend their learning, but which had motivational impact as it allowed them to be more autonomous learners and to undertake more sophisticated levels of research.

Emerging messages from the research

Overall, within school situations, this study suggests that the use of ICT can result in positive motivation for both learners and teachers. However, the approach taken by teachers towards the use of ICT in lessons is important. Through improving motivation, it is suggested that ICT can impact on pupils' attitudes and the quality of their work, but if attainment outcomes are to be realised then the uses of ICT need to impact upon subject specific learning processes.

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