

# Reaping ITEM Benefits

## *A Link Between Staff ICT Access, Ability and Use*

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**Abstract:** This paper reports on a survey of ICT Access, Ability and Use conducted among 25 schools in England and Wales in 2002/03. The survey concentrated on school staff, and sought to investigate links between four key areas: (a) access to ICT both in and outside school; (b) perceived and desired ICT ability of staff; (c) use of ICT both in and outside school; and (d) issues which inhibit increased use of ICT in teaching, learning and administration. Survey results indicated that access to ICT resources was high for this sample, both at school and at home. Furthermore, staff reported overall satisfaction with their ICT abilities across core applications, whilst calling for more training in 'advanced' applications. Despite these confident results regarding Access and Ability, staff reported wide variability in actual Use of ICT. Results drawn from the survey are contrasted with comparable studies from the UK and overseas, with a view to assisting schools to reap the benefits of e-learning innovations.

**Key words:** School information systems, Professional Development, Educational Management, information technology.

## 1 INTRODUCTION

A number of commentators have highlighted concerns regarding the implementation of ICT policies for staff in schools. These concerns revolve around issues relating to staff access to ICT resources, staff ICT training, and the encouragement of staff ICT confidence and competence. Conventional wisdom suggests that high access to ICT and high ability with ICT must lead to high use of ICT. That is, "ICT Access + ICT Ability = ICT Use". It is unclear in the literature, however, how these variables may be linked, if at all.

A pilot study conducted in late 2001 at one school (O'Mahony 2002) suggested certain trends:

- Home access to ICT, including Internet and email, was high.
- Staff confidence with a number of ICT applications was strong, and staff were seeking to advance their skills.
- Classroom use of ICT was variable.
- The key inhibitors to using ICT in the classroom were time, training and resources.

The pilot study had a sample population of some 100 staff members. It was clear that a wider study would help to either corroborate these findings, or suggest alternative trends. The main research questions for the 2002/03 study were as follows:

- What are the current levels of access to ICT resources among school staff?
- What are the current levels of ability with ICT among school staff?
- What are the current levels of use of ICT resources among school staff?
- What are the main barriers to increasing the use of ICT in teaching, learning and administration?
- What links can be perceived between ICT Access, Ability and Use?

In late 2002, the British Educational Communications and Technology Agency (Becta) sponsored research to seek answers to the areas noted above. The research had two main phases: Survey and Scholarship. Both phases were conducted concurrently between October 2002 and March 2003. A questionnaire was developed in August and September 2002, and administered in October 2002. The target population were 2800 staff members drawn from the 3,500 staff employed in the 25 schools operated by the Girls' Day School Trust (GDST). In total, 1366 responses were received, analysed between November 2002 and March 2003.

At the same time, an extensive review of the literature was conducted, investigating links between key research dimensions. The two phases of the research programme were complementary. The scholarship phase helped to inform questionnaire construction and survey design. Similarly, results of the survey were compared with benchmarks drawn from the literature.

Results indicated that although access to ICT resources was high, staff throughout the Trust could improve their integration of ICT use in teaching, learning and administration. High levels of access to ICT resources were reported, well above national averages (Watson 2001, DfES 2000). Despite concentrations of ICT use, however, and some exciting initiatives both locally and centrally, the majority of staff used these resources less frequently than anticipated. The level of ICT training was perceived as insufficient to meet needs, the main criticism being a lack of time available for training, given the range of commitments in which staff are involved.

Outcomes of the survey included practical areas for consideration, including training programmes, home-school network links and carefully targeted ICT resourcing. Although much had been invested, the challenge was to reap the return on that investment more fully.

## **2 THEORETICAL BACKGROUND AND CONTEXT**

### **2.1 ICT Access**

The general domain regarding ICT in schools has gathered significant research momentum in recent years (Stevenson 1997, Research Machines 2000, National Statistics 2002). One area of debate concerning ICT in schools is a recognition that high levels of access are required to achieve a 'critical mass' of user confidence and ability. Since the publication of documents such as the Stevenson Report (1997), schools have experienced large-scale funding of infrastructure and equipment, especially in connection with the National Grid for Learning (DfES 2001).

Case studies reflecting successful computer integration have all shown such schools to be provided with excellent facilities, technical backup and financial resources (Mumtaz 2000). Other writers express reservations that access to ICT, on its own, will provide positive educational outcomes (Cuban 2000). High level of access to ICT resources is an important goal, but is itself a means to a greater end. Within the literature concerning ICT access, therefore, are frequent links with ICT use and ICT ability. Government agencies in particular seek to quantify return on investment, and seek to collect qualitative evidence of ICT effectiveness in schools (Becta 2000, Becta 2001a, Becta 2001b, NGfL 2001, DfES 2002).

National Statistics (DfES 2002) report, in a study based on data collected in early 2002, that 85% of teachers had access to home computers. There is growing evidence that higher ratios of home access have a positive effect on ICT ability and use. For instance, the major Impact2 study (NGfL 2002b) reports that "Having a computer at home has a significant impact on teachers' ICT capability."

### **2.2 ICT Ability**

It is generally acknowledged in the literature that getting ICT professional development 'right' is very difficult to achieve (Mumtaz 2000, Selwood et al. 2000, Visscher & Brandhorst 2001, McDougall & Squires 1997). At the same time, despite the difficulties, there is also recognition

that there are critical links between staff ICT ability and staff ICT use, and staff ICT ability and student ICT ability (Kennewell et al. 2000, Russell et al. 2000, NGfL 2002c).

### **2.3 ICT Use**

A number of factors influence staff ICT use. The survey reported here looked closely at relationships between ICT Access, ICT Ability, ICT Use and ICT Inhibitors to use. These factors, and others, can be discerned in the literature. Mumtaz (2000), in her review of this area, highlights both positive and negative factors affecting ICT use. Positive factors include "...collegiality among computer-using teachers at their school, school support for consequential computer activities, resources for school development, smaller class sizes and more formal computer training." (Mumtaz 2000). Technical support and senior management commitment are other recurring themes (NGfL 2002d).

Another theme apparent in the literature is the attitudes of staff. National Statistics notes that 76% of teachers felt confident using ICT in the curriculum (National Statistics 2002). However, "Schools can only go so far to encourage ICT use - actual take-up depends largely on teachers' personal feelings, skills and attitudes to IT in general." (Mumtaz 2000). This is corroborated by Hruskocny et al. (2000), Kirkman (2000), and Yee (2000).

### **2.4 ICT Inhibitors**

Although reports concerning improvements in ICT Access and ICT confidence are encouraging, such improvements appear to be patchy across phases, subject areas and geographical location. A number of inhibitors to ICT use are evident in the literature, which appear to be cross-phase, cross-department and geographically independent. Foremost among these inhibitors are the following:

- Lack of time (NGfL 2002a, NGfL 2002b, Mumtaz 2000, Kirkman 2000).
- Lack of training (Kirkman 2000, Mumtaz 2000).
- Lack of senior management support (Kennewell et al. 2000, NGfL 2002a, NGfL 2002b, Passey 2002).
- Lack of technical support (Sheingold & Hadley 1990, NGfL 2002c, NGfL 2002d, Yee 2000).
- Lack of a genuinely supportive culture (Sheingold & Hadley 1990, Kennewell et al. 2000, Mumtaz 2000).
- Lack of teacher confidence and motivation (Kirkman 2000, NGfL 2001, NGfL 2002a, NGfL 2002b).
- Lack of ICT resources (Sheingold & Hadley 1990, Mumtaz 2000).

In summary, the literature is rich in both qualitative and quantitative studies concerning the four dimensions under investigation in this survey. Although these four dimensions frequently appear, however, there are few studies that attempt to quantify the relationships between them. In this context, a quantitative study of the relationship between ICT Access, ICT Ability, ICT Use and ICT Inhibitors would appear timely.

## **2.5 Contextual Background**

The Girls' Day School Trust has been operating since 1872, and is the largest group of independent schools in the UK. Twelve of the schools are based in London, and another thirteen are in regional centres. GDST schools have about 20,000 students on roll at any one time. Around 3500 staff are employed in GDST schools, of which 2800 were targeted in this study.

In 1995, the Trust made a commitment to ICT in its schools. At that time, it embarked on a policy which included a strong investment in ICT infrastructure, including LANs in each school and a Wide Area Network connecting all Trust sites, investments in software and hardware, staff training and ICT management mechanisms. A rollout of ISDN connections was completed in 1997, providing data communications links between schools and Trust Office, as well as access to Trust-wide email services and to the Internet. Local Area Networks in individual schools progressed simultaneously, funded centrally. To make effective use of this infrastructure, the Trust set aside funding on a per capita basis for each school, designed to cover purchasing of PCs and other peripherals, software licences, consumables, staff training and ongoing maintenance.

An important element of the Trust's initiative was the establishment of IS management posts in each school. Historically, like many other schools, the Trust had relied on enthusiastic teaching staff to provide technical ICT support. As the initiative developed and ICT became more complex and more pervasive, the Trust recognised the need for full-time technical support. By 1998, all Trust schools had either an Information Systems Manager or Network Manager and at least one ICT technician. This followed on from the establishment of a central support team who have provided high-level technical support and R&D, as well as assisting in setting policies and strategy, monitoring targets and technical progress in schools throughout the initiative.

Major internal audits of the Trust's ICT initiative in 1997, 1998 and 2001 (conducted by the Education, Finance, and ICT Managers) provided useful steering mechanisms. These audits helped to establish key elements of the Trust's ICT policies, including:

- Agreement on a common network infrastructure.

- Agreement on a common MIS solution, including the strategic use of assessment data.
- Agreement on the need for an annual ICT strategic planning process.
- Agreement on specific targets for ICT competence among both staff and students.
- Agreement on both central and local strategies designed to meet those targets.

Within and between Trust schools, there is a growing recognition throughout their communities (Staff, students, parents, and the like) that:

- Information and communication is swiftly becoming the 'nervous system', or the bloodstream of the school.
- ICT increasingly enables this flow of information and communication.
- ICT is the current fulcrum of radical change in education.
- ICT is an integral part of learning, both as content and medium, and is essential to the management of teaching and administration of the school.

In this context, the Trust was keen to explore links between the key research variables. In liaison with the Heads of each school, approval was given to approach staff for the purposes of this investigation.

### **3 METHODOLOGY**

Both Scholarship and Survey phases occurred concurrently. An extensive literature review was undertaken before, during and after the survey instrument was administered. Results drawn from sources such as National Statistics, DfES, Becta, BESA, Fischer Family Trust, relevant academic journals and conference proceedings in this field were used to provide benchmarks for the survey phase. As responses were analysed, these benchmarks were used to contextualise and validate the results.

In the Survey Phase, a survey instrument was administered across 25 schools in September 2002. The survey investigated the four dimensions previously stated. Research questions drew on the work of previous research (McDougall & Squires 1997, Cox et al. 1999, Mumtaz 2000, O'Mahony 2000, O'Mahony 2002). The primary focus of the survey was its practical element. It was designed to provide swift feedback into ICT strategic planning exercises. In this sense, the study had a strong Action Research dimension (Baskerville & Wood-Harper 1996, Klein & Myers 1999).

Completed survey forms were collated in October 2002, and results were analysed from November 2002 to February 2003, according to strata such as School, Region, Age, Phase (Primary, Secondary) and Department. Data were analysed to explore relationships between dependent and independent variables.

## 4 RESULTS

### 4.1 ICT Access

Respondents were asked about their access to ICT at home. Results are shown below in Table 1, categorised by age group.

<b>Home Access to computers</b>	<b>&lt;25</b>	<b>25-34</b>	<b>35-44</b>	<b>45-54</b>	<b>&gt;54</b>	<b>TOTAL</b>	<b>%</b>
TOTAL	31	222	290	522	224	1302	95%
Percent	100%	93%	95%	99%	94%	95%	
<b>Home Access to Internet</b>							
TOTAL	28	193	262	454	190	1127	83%
Percent	90%	81%	86%	86%	79%	83%	
<b>Home Access to email</b>							
TOTAL	24	188	260	449	189	1110	82%
Percent	77%	79%	85%	49%	79%	82%	

Table 1: Home access to ICT

Respondents were asked to evaluate their access within school to computers, Internet and email, using a scale of 1 to 4, where 1 = Very difficult, and 4 = Very easy. The following table (Table 2) shows school access to ICT broken down by age and phase:

Stratum	# Responses	Computer Access	Internet Access	Email Access
<25	31	3.58	3.19	3.35
25-34	247	3.44	3.32	3.20
35-44	305	3.43	3.20	3.25
45-54	530	3.37	3.13	3.16
>54	239	3.27	3.11	3.09
All Primary	377	3.46	3.04	3.12
All Secondary	989	3.36	3.18	3.18
TRUST AVERAGE	1366	3.39	3.18	3.18

Table 2: Work Access to ICT (Where 1 = Very difficult, and 4 = Very easy)

## 4.2 ICT Ability

In Question 19 of the questionnaire, staff were asked to self-assess their current ability with a selection of applications. In Question 20, they were asked to nominate their desired level of ability with the same selection of applications. To determine 'training priorities', the differential between 'current' and 'desired' was calculated for each application. These priorities were calculated for primary and secondary phases, and are shown in Table 3:

	<b>Trust-Wide</b>	<b>Primary</b>	<b>Secondary</b>
<b>Priority</b>	<b>Application</b>	<b>Application</b>	<b>Application</b>
1	Digital Whiteboards	Powerpoint	Powerpoint
2	Powerpoint	Digital Whiteboards	Digital Whiteboards
3	Microsoft Publisher	Microsoft Publisher	Microsoft Publisher
4	Web Design	Web Design	Data Projectors
5	Data Projectors	Microsoft Access	Microsoft Access
6	Microsoft Access	Microsoft Excel	Web Design
7	Microsoft Excel	Data Projectors	Microsoft Excel
8	Web Searching	Web Searching	Web Searching
9	Email	Email	Email
10	Microsoft Word	Microsoft Word	Microsoft Word

Table 3: ICT Training Priorities

As can be seen from Table 3, most GDST staff expressed confidence in their ability with core applications such as word processing, email and Internet searching. The main priorities perceived by GDST staff were for training in presentation-based applications (hardware and software), the clear implication being that they recognised genuine benefit for teaching and learning from these skills.

## 4.3 ICT Use

The following table (Table 4) summarises staff responses regarding Use of ICT. These figures are broken down by age strata, and are expressed in terms of average hours per week.

	<25	25-34	35-44	45-54	>54	AVG
<b>Home Computer</b>						
For Home	2.68	1.95	1.98	1.88	2.42	2.02
For School	3.13	3.27	3.10	3.31	2.87	3.16
<b>Home Internet</b>						
For Home	1.99	1.51	1.25	1.32	0.97	1.29



For School	0.86	0.77	0.75	0.80	0.43	0.72
<b>Home Email</b>						
For Home	1.11	0.89	0.86	0.90	0.93	0.90
For School	0.15	0.21	0.21	0.35	0.17	0.26
<b>At work</b>						
Work Computer	5.98	3.94	6.64	4.74	4.61	5.03
Work Internet	1.09	1.02	0.83	0.82	0.59	0.82
Work Email	0.99	0.92	1.21	1.00	1.12	1.06
<b>In Class</b>						
Class Computer	0.48	1.34	1.44	1.37	1.18	1.31
Class Internet	0.18	0.36	0.28	0.28	0.21	0.28
Class Email	0.03	0.02	0.01	0.07	0.01	0.04

Table 4: Staff ICT Use (Average hours per week)

#### 4.4 ICT Barriers

Staff were asked to rank a set of ten items in response to the question “What’s holding you back?” These items were ranked on a scale of 1 to 10, where 1 = biggest problem, and 10 = least problem. The following table (Table 5) ranks these inhibitors across strata:

	Whole sample	Primary	Secondary	<25	25-34	35-44	45-54	>54
Time	1	1	1	1	1	1	1	1
Quantity of ICT Training	2	2	2	2	2	2	2	2
Quantity of Classroom ICT resources	3	4	3	4	3	3	3	4
Quantity of ICT Support	4	3	5	8	5	4	4	3
Quantity of Staff ICT Resources	5	8	4	=5	4	6	5	7
Quality of Classroom ICT Resources	6	6	6	=5	6	5	6	5
Quality of ICT Training	7	5	7	3	7	7	7	6
Quality of Staff ICT Resources	8	9	8	7	8	8	8	9
Quality of ICT Support	9	7	9	9	9	9	9	8
Willingness	10	10	10	10	10	10	10	10

Table 5: ICT Barriers to Use (1=biggest problem, 10 = least problem)

Analysing the above table provides a rich indicator for ICT strategic planning. The 'top five' inhibitors were those perceived by a significant proportion of respondents as needing addressing.

- Across the entire sample, TIME was seen as the biggest barrier to the use of ICT.
- The amount of ICT training (Quantity) was perceived as a significant barrier to the use of ICT.
- Other barriers tended to focus on the level of resourcing (Quantity), rather than the quality of those resources.

## **4.5 Correlating the Results**

The main research hypothesis sought to test the notion that “ICT Access + ICT Ability = ICT Use”. A number of different correlations were tested across the sample. Results show that generally staff will use ICT more when they have greater access. More specifically, the results show that ability, rather than access, is a stronger predictor of ICT use. There appear to be a large number of staff who have reasonable access to ICT both at home and at school, but at the same time demonstrate low ICT use. These staff will clearly need to be the focus for subsequent ICT initiatives.

In the under 25 age group, ability is related to ICT use far more than for other age groups. This suggests that age may influence ICT use and ICT ability. Younger staff also demonstrate greater ICT access, particularly at home. One possible explanation may be that people under 30 who have used computers since being students themselves have greater ICT confidence, and therefore demonstrate greater ICT use. Conversely, the staff to target are therefore those over 30 who have indicated low ICT ability. ICT training initiatives should target those who are uncomfortable using ICT.

Correlation coefficients were calculated for all variables, and were tested at the 0.005 level of validity (Attwood et al. 2000). That is, there is a less than 0.5% chance that these correlations are purely by chance. The coefficients were found to be significant, thus the null hypothesis - “Access + Ability  $\nabla$  Use” must be rejected.

## **5 CONCLUSIONS**

The main research questions for this study were as follows:

- What are the current levels of access to ICT resources among school staff?
- What are the current levels of ability with ICT among school staff?

- What are the current levels of use of ICT resources among school staff?
- What are the main barriers to increasing the use of ICT in teaching, learning and administration?
- What links can be perceived between ICT Access, Ability and Use?

## **5.1 ICT Access**

Both at home and at work, respondents reported high levels of access to computers, including Internet and email access. Arising from this finding, it is recommended that school managers target their funding and resources on that diminishing number of staff without access. Furthermore, the finding suggested that strategies such as a global staff laptop programme were not warranted. Rather, concentrating funding on the development of remote-access technologies, such as Extranets, Virtual Private Networks and Virtual Learning Environments would help school managers to reap the benefits of this high level of access.

## **5.2 ICT Ability**

In terms of ability, it was found that most staff perceived that they had a core competence in ICT applications, and were seeking to extend their abilities to a higher level. This finding confirmed the results of other internal reviews into investment in training strategies such as ECDL. In order to make best use of this core competence and extend it, school managers should consider the development of a central ICT staff training function. Such a role could centrally monitor and coordinate staff training in ITEM as well as exemplary ICT for teaching and learning.

## **5.3 ICT Use**

Within the sample under investigation, staff reported relatively high use of ICT resources at home and outside of classes. Within classes, however, wide variability of ICT use was reported (between 0 and 11 hours per week, depending on departmental area). As noted above, the development of remote access technologies may well encourage the transfer of staff ICT use from home to school. It is further recommended that school managers target individual departmental areas to encourage classroom use of ICT. This should be closely linked to externally mandated curriculum outcomes as well as internal curriculum targets.

## 5.4 Barriers to ICT Use

The study highlighted some barriers confronting staff as they seek to integrate ICT use more fully in their teaching, learning and administration. Chief among these were lack of time, amount of support staff, and the amount and quality of ICT training. To a lesser extent, but still worthy of comment, many staff reported that both the quantity and quality of staff ICT resources was a significant issue. These issues present serious challenges for school managers. Suggestions for overcoming these barriers include:

- Celebrate existing successful strategies for enabling staff sufficient time to assimilate new learning technologies.
- Continue to seek further innovative models for staff ICT training.
- Revisit both the job and person specification of ICT support personnel, as well as the quantity of ICT support provision in individual schools.
- Set specific targets within individual school IT strategic plans for delivering resources, time and support for staff, as well as clearly-defined targets for evidence of ICT use in teaching, learning and administration.

## 5.5 Correlations between variables

There is a positive correlation between (ICT Access + ICT Ability) and ICT Use (0.54)

This correlation is most pronounced among staff under 35 years old: (0.67)

Work Access is seen as a stronger predictor of ICT Use than Home Access: (0.3383 vs 0.2118)

These correlations are significant at the 0.005 level (Attwood et al. 2000)

## 6 IN CONCLUSION

This research sought to answer questions regarding ICT Access, ICT Ability and ICT Use among a large sample of UK school staff. On the one hand, there are some encouraging results, suggesting that core issues regarding access to ICT resources and core competence with ICT are being addressed. This is the result both of interventionist policies by the GDST, as well as the influence of external factors outside the control of the Trust.

On the other hand, challenges exist. Despite an underlying willingness to move forward with ICT Ability and ICT Use, staff feel constrained by issues such as lack of available time, and a lack of relevant training. Like other schools and school authorities, the GDST is also constantly faced with other challenges, such as sustainability, security, cost management, technical support management and change management.

The future for ICT in the Girls' Day School Trust looks exciting, as it considers the way forward with evolving technologies such as VLEs and MLEs, integrated management systems, videoconferencing and the like. By maintaining their agility in an ever-changing ICT landscape, staff of the GDST are well-placed to respond positively to these evolving technologies, and truly 'reap ITEM benefits.'

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