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Co-ordinating Information Technology in Secondary Schools

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Abstract

Due to the nature of Information Technology in UK secondary schools an essential middle management role has developed over the years - the IT Coordinator (ITC). The ITC is required to combine a daunting number of roles and skills including provision of in-service training (INSET) and cross-curricular support for colleagues, technical expertise, curriculum planning, whole school resource management, etc. The role will vary from school to school. However, this paper endeavours to identify many of the duties, responsibilities and skills commonly required by secondary ITCs. The paper then reports on a survey concerning the professional development needs of secondary ITCs reporting on such aspects as - the nature of the difficulties perceived by ITCs in meeting the demands of their roles; the value of sources of professional development and support available to ITCs; some relationships between contexts, roles, concerns and professional development sources; and draws some conclusions regarding the coordination of IT in secondary schools.

1. Introduction

Historically, the use of IT in Education has focused on computers and, in very general terms, serves three distinct purposes:

- for pupils to learn about IT (How IT works. How to use IT. The effects and implications for society of the application of IT);
- to support teaching and learning across the curriculum;
- to aid the administration and management of the school.

The Education Reform Act (House of Commons, 1988) introduced a National Curriculum to England and Wales, and one small part of this established an Information Technology (IT) capability as a statutory entitlement for all children.

However, IT capability was not to be developed through IT becoming one of the core or foundation subjects, rather it was felt that:

"The IT programmes of study are best taught through other subjects." (NCC. 1990)

The logic behind this was that the National Curriculum Council felt

"the main purpose of IT in schools is to support the teaching and learning of other subjects" (NCC. 1991)

There was, however, no compulsion to develop IT capability through other subjects. If time could be found in an overcrowded curriculum, it could have been taught as a subject in its own right. However, in a survey in 1991, Passcy and Ridgeway (1991) found that 58 out of 70 IT co-ordinators indicated their intention to develop IT across the curriculum, with only 13 out of 70 seeing IT remaining as a specialist subject, though this intention does not yet seem to have come to fruition (Selwood & Jenkinson, 1995) (Kennewell & Selwood, 1997).

For a variety of reasons the National Curriculum for England was first reviewed and then revised (DFE, 1995). The significance of this review for IT was twofold - IT became a subject in its own right and was no longer part of the Design and Technology curriculum, and a statement appears on the first page of all subject orders other than Physical Education:

"Pupils should be given opportunities, where appropriate, to develop and apply their information technology capability in their study of *(subject)*" (DFE, 1995)

As the manner in which secondary schools develop IT capability is left to the schools but strong pressure is exerted upon them to be developed IT through other subjects a number of models of development can and have been identified (eg Smith (1991), Selwood & Jenkinson (1995)). In the research discussed later in this paper four models were proposed:

Model 1: other subject departments schedule IT lessons when appropriate to their scheme of work.

Model 2: IT lessons are scheduled centrally, but are allocated to other subject departments to teach IT.

Model 3: IT lessons are taught by specialist teachers, with activity contexts provided by other subjects.

Model 4: IT lessons are taught by specialist teachers, with activity contexts devised by the IT specialists.

2. The role of the ITC

It is apparent that if IT capability is to be developed in a coherent manner, that ensures progression of capability and continuity of experience using any of the permeated models (Models 1-3) then there is a need for effective co-ordination of IT. This then is one of the roles of the IT Co-ordinator (ITC) in UK secondary schools. As long ago as 1972 the need for an 'IT co-ordinator' in schools was evident

(IFIP. 1972) more recently Evans (1988/89). North (1990). the National Curriculum Council (NCC. 1990) discussed and defined the crucial role of the ITC. The importance of this role can be seen by the fact that texts concerning it continue to be

published Tagg (1995) Crawford (1997). By examining the above publications and combining this with previous research (Fox & Selwood. 1992) (Selwood & Jenkinson. 1995) and personal knowledge of many ICTs the following list has been derived.

Table 1

Co-ordination of IT across the curriculum	<p>Chair IT committee.</p> <p>Carry out IT audits (hardware, software, staff skills, student skills).</p> <p>Produce IT policy.</p> <p>Produce IT development plan.</p> <p>Assist Heads of Department in producing their IT policies /development plans.</p> <p>Ensure that IT capability is developed in line with National Curriculum requirements. Advise senior management on progress of IT policy.</p> <p>Review policy and development plans.</p> <p>Ensure that assessment of pupil's IT capability takes place, and is appropriately recorded</p>
Resource allocation	<p>Have overall responsibility for schools IT resources.</p> <p>Liaise with Heads of Department on future IT needs.</p> <p>Provide support for evaluating hardware and software.</p> <p>Advise on purchase of software and hardware.</p> <p>Be responsible for allocation and deployment of IT resources</p>
System maintenance	<p>Be responsible for security, maintenance and repair of all the IT equipment within the school.</p> <p>Load software onto computers (including networks).</p> <p>Adapt and modify software.</p> <p>Manage the computer networks.</p> <p>Maintain schools intranet.</p> <p>Control access to Internet.</p> <p>Maintain schools software library.</p> <p>Be responsible for supervision of IT technician (if lucky enough to have one)</p>

Staff training and support	<p>Identify staff INSET needs with respect to IT.</p> <p>Organise and run school-based IT INSET (including liaison with other INSET providers).</p> <p>Promote the use of IT amongst all staff.</p> <p>Advise teachers on the integration of IT into their schemes of work.</p> <p>Provide advice to teachers on the use of software in their subject.</p> <p>Provide classroom support for teachers using IT.</p> <p>Assist teachers in the development and production of curriculum materials.</p> <p>Advise teachers on the teaching and learning styles associated with IT</p>
Specialist IT at KS3 (11-14 year olds) and examination courses at KS4 (14-16 year olds) and post-16	<p>Take on role of Head of IT department in managing and teaching of specialist IT course.</p> <p>Decide on which syllabuses are studied at KS4 and post 16</p>
External liaison	<p>Keep up-to-date on latest technological developments in IT, and sources of equipment.</p> <p>Keep up-to-date on the use of IT in the curriculum.</p> <p>Keep up-to-date with all legal legislation concerning IT eg Health and Safety, Data Protection, Privacy, Computer Misuse.</p> <p>Liaise with LEA advisory service.</p> <p>Liaise with other schools (particularly feeder schools)</p>
School's Management Information System	<p>Manage school's computerised management information system - with all that this implies</p>

A daunting list which it is obvious that only superman/woman could actually perform but many ITCs are expected to fulfil such a role. However, few other roles can vary as much from one school to another, or can be filled by staff with such varied backgrounds. Very few ITCs were initially trained to teach IT as a specialist subject (Her Majesty's Inspectorate. 1992); furthermore, there is anecdotal evidence that many teachers with long experience in specialist IT teaching are seen by their head teachers as unsuited to this cross-curricular role.

3. Co-ordinating IT in secondary schools

In order to illuminate the nature of the contexts, roles, concerns and needs of ITCs, a survey was carried out in the UK by the Computer Education Group (CEG) in the spring of 1996. The main purposes of conducting the survey were to:

1. summarise the contexts which ITCs experienced, the extent to which certain possible features of the ITC's role were carried out by ITCs, and the nature of the difficulties perceived by ITCs in meeting these expectations;
2. determine the relative value which ITCs placed on sources of professional development;
3. explore relationships amongst contexts, roles, concerns and professional development sources;
4. draw conclusions regarding the implications for those aiming to provide initial training and professional development in IT for teachers, particularly the IT subject associations.

A questionnaire was sent to all secondary schools and further education colleges in the UK. Since Scotland and Northern Ireland have different national curricula, the analysis presented here is based on the 456 responses which were received from the 4760 questionnaires sent out to institutions in England and Wales. Although this is a low response rate, and as a sample it may be biased towards those experiencing most difficulty with implementing the IT curriculum, the number of responses is large enough to support some tentative conclusions concerning relationships between the variables and their implications for providers of support and training.

3.1 Results

A descriptive summary of the main results of the survey was published by the CEG (the sponsors of the research) in *Computer Education* (Kennewell, 1996). After further analysis, additional results were published (Kennewell & Selwood, 1997). What is presented here draws on both of these original papers to illustrate the size and complexity of the task of co-ordinating IT in UK secondary schools.

3.1.1 Contexts

The type of school/college was classified as one of four types where possible. These are listed below, together with the number of responses from each type:

- Schools funded by Local Education Authorities (LEA); n=265.
- Grant Maintained (GM) schools funded directly by the government; n=64.
- Schools which are fee paying and self-managing and not bound by the National Curriculum (Independent); n=81.
- Colleges teaching only students over age 16; n=14.

The last group were excluded from the analysis, as their roles and curricula are significantly different with respect to the issues under consideration.

ITCs were asked about the size of school and the average number on roll was 870, ranging from 30 to 2400. This was used in conjunction with the total number of computers to calculate an overall pupil-computer ratio of 11.5 to 1 at the time of the survey, and 10 to 1 by the following year if no computers are scrapped.

For each year group, ITCs were asked to indicate which one or more of four IT curriculum implementation models (see section 1 of this paper) best represented their school's practice. Table 2 shows the percentages of those responding for each year who indicated particular models or combinations of models. The results are for England and Wales only.

Table 2

Model	% using in year 7	% using in year 8	% using in year 9	% using in year 10	% using in year 11
1 only	13	27	29	38	40
1 and 4 only	30	18	21	19	18
1 in any combination	55	62	66	69	68
2 in any combination	10	10	9	7	5
3 in any combination	26	23	20	14	13
4 only	30	23	20	21	21
4 in any combination	66	53	32	28	24
Other model (in any combination)	2	1	3	5	5

This shows an increase in curriculum permeation as pupils progress through KS 3 and 4, but with significant changes in the numbers using only integration first between years 7 and 8, and again between years 9 and 10. 20% of schools seemed to teach IT Capability only in discrete lessons throughout. Table 3 shows the percentages of ITCs (including post-16 institutions) offering each type of award bearing IT course.

Table 2

Course	Institutions offering (%)
A-level	26
GCSE Information Studies	42
KS4 Short Course IT	18
GCSE Business & IT	28
GNVQ	11
Other examination courses	11
Other competence certificates	40

The number of specialist IT teachers in the schools in the survey varied between 0 and 11, with an average of 1.8. However, the question could be interpreted several ways: total number of teachers who teach specialist IT lessons; number of teachers who teach mainly IT; number of full-time equivalent IT teachers; number of teachers with an IT specialist qualification. No clear conclusions can be drawn, but it is worth noting that 40% of institutions had just 1 "IT specialist", however interpreted, and 12% had no recognised IT specialist.

3.1.2 Roles and difficulties

Table 4 shows the roles of the person responding, with most indicating more than one. A list of seven roles was presented to ITCs, and they were asked to indicate which of the roles they carried out in practice, and which two of these were the most difficult. These roles had previously been identified through discussion with a focus group of ITCs.

Table 4

Role	Respondents (%)
IT coordinator	87
IT specialist teacher	36
Other subject teacher	27
Other position	6

Table 5 ITCs' roles and the extent to which they were seen as the most difficult (n=442). Since the last three were seen as the most difficult by relatively few ITCs, they were not considered in subsequent analysis.

Table 5

Role of ITC	% of ITCs with the role	% of those with the role who felt that it was one of the two most difficult
Resource allocation	87	23
System maintenance	81	44
Staff training	92	31
Co-ordination across the curriculum	91	66
Classroom support for staff	67	16
Specialist IT at KS3 (11-14 year olds)	73	1
Examination courses at KS4 (14-16 year olds) and post- 16	70	5
Other		15

ITCs also identified a variety of other roles. Many were essentially aspects of, or variations on, one of those listed, eg teaching GNVQ core skills. Some had senior staff roles, or were heads of other departments (Maths, Technology, Business Studies). Many had responsibilities relating to administrative systems. Others had responsibilities such as examinations officer or head of learning resources.

ITCs were invited to add other comments to the questionnaire, and these help to complete the picture. These comments revealed that many ITCs are feeling under great pressure to fulfil a variety of roles, with inadequate time, often no technical support, and a lack of understanding of the issues by senior management. For these ITCs, it is not the **nature** of the tasks which make them difficult, but the sheer **number** of them.

3.1.3 Concerns for the future

ITCs were invited to express their concerns for the future, by means of an open response format question. The majority referred to a shortage of resources. Many distinguished between hardware and software, and between new machines and upgrading, but the keyword 'resources' was used for all these. From most responses, it was clear that whilst hardware was still the biggest resource problem, the need to obtain up-to-date equipment to replace old machines was paramount, rather than the number of machines per se. Other aspects of system resourcing, such as 'maintenance' and 'Internet' were identified separately, as were other resource issues such as staffing and rooming. Some ITCs referred only to finance without being more specific about its purpose; the keyword 'money' was used for these.

The other very big issue was that of cross-curricular teaching and application of IT, and the InSET required to support this. Many ITCs were concerned about equity issues

- ensuring that pupils have equal access to equipment, and that they receive their curriculum entitlement to IT with differing standards of staff within departments and timetabling problems. KS4 is a particular problem at present, with pressures on many to reduce exam courses (despite the curriculum time being "freed" by the NC changes), and concern that pupils will not progress with only cross-curricular use of IT. Difficulties of assessment in cross-curricular models were also identified.

Many ITCs were expected to carry out a technical support role, and felt the need for a technician. These were number of ITCs who identified each of the main issues, with the keywords listed in areas of concern (Table 6).

Of those indicating concern about resources, 48% specifically referred to the upgrading or replacement of out-of-date equipment, 19% referred specifically to software and 44% to hardware.

Table 6

Specialist teaching, cross-curricular teaching and staff training	
other subjects	83
assessment	35
Inset	81
NC	52
student access/entitlement	28
Progression	15
KS4	45
exam courses	10
Finance/resourcing	
money	52
Internet	14
resources	253
timetabling	14
specialist staff	11
technician	31
Maintenance	25
Personal and job role issues	
Time	77

updating knowledge	26
attitude of SM	7
OFSTED	5
policy implementation	4
Technical issues	
pace of development	11
compatibility	5

3.1.4 Sources of advice and support

ITCs were asked to rate various possible sources of advice and support on a 0 to 5 scale, with 0 representing 'not used' and 5 'very useful'. A mean of the non-zero scores was calculated. Table 7 shows the sources of advice and support listed in order of decreasing value to ITC's (N=442).

Table 7

Source of advice and support	% using the source	Mean rating of those using the source (range 0-5)
1. Colleagues	86	3.0
2. Other books/packs	71	3.0
3. NCET publications	84	3.0
4. LEA advisory services	68	3.0
5. SCAA guidance	81	2.9
6. Journals of professional associations for IT in education	80	2.7
7. Commercial IT education magazines	85	2.7
8. Independent consultants	40	2.7
9. Popular computer magazines	80	2.6
10. NCET staff	39	2.6
11. General educational publications	77	2.2

12. Higher Education Institutions	23	2.1
13. Academic journals	44	1.9

Four main factors emerged from a factor analysis of these preferences, and we have given a name to each based on the common characteristics of the variables which load on them:

- Periodical reader (sources 6, 7, 9, 11, 13)
- National support user (sources 3, 5, 10)
- Local support user (sources 1, 4)
- Expertise seeker (sources 2, 8, 12)

We have also calculated factor scores for each ITC as the mean of the values of the component variables of each factor. For example, a respondent's score for 'Periodical reader' is the mean of their rating for sources 6, 7, 9, 11 and 13. These scores were used to explore relationships with other variables.

3.1.5 Relationships amongst the variables

In order to analyse the associations within the data, a variety of possible relationships were hypothesised, and appropriate statistical tests applied. A full discussion of these relationships can be found in Kennewell & Selwood (1997) what is presented here is a brief summary of our conclusions following this analysis:

- In many schools, the shortage of resources and the age of equipment makes the work of the teacher responsible for IT difficult.
- Keeping equipment running from day to day is seen as a necessity, whereas curriculum matters are less pressing.
- Policies of permeating IT throughout the curriculum pose particular difficulties in ensuring that pupils develop IT concepts and skills, and these challenges conflict with simultaneous demands for teaching specialist lessons.
- Because of their workload, many ITCs see the professional development of colleagues as a problem rather than an opportunity.
- ITCs are primarily concerned with practical matters.
- Assistance with helping teach IT through other subjects is the highest priority at present, although there is considerable interest in ideas for teaching IT as a subject itself.
- The needs of ITCs vary according to the size and type of school, as well as their roles and interests.
- Many ITCs do not place great value on the sources of professional development available to them, and those who value one source of professional development tend to value other sources as well.
- Colleagues in other schools are seen as the best sources of support and advice.

4. The Future

It is apparent from the above that co-ordination of IT in secondary schools is both a wide ranging and complex task. However, the future is possibly brighter than it has been for sometime and a brief examination of some of the major issues and trends may help to illustrate this claim.

Official opinion regarding the most appropriate model of for developing IT capability seems to be changing from the use of a fully permeated model to a mixed delivery mode. Though this in itself is problematic with a lack of trained IT teachers. Some school inspection reports have noted that results are unsatisfactory when schools plan to teach IT in a fully permeated fashion, yet other reports comment unfavourably on the limited use of IT in other subjects (Bowen, 1995). A mixed delivery model is thus clearly favoured by inspectors, and this is reflected in the recommendations of government advisors (such as Dearing, 1994). The introduction of a National Curriculum for ICT (TTA, 1998a) in teacher education and the £230 million pounds of lottery funding to provide training or re-training for all 500,000 practising teachers (TTA, 1998(b)) should, at least in the long term reduce the support needed by subject teachers.

The enormity of the ITC's task has been highlighted throughout this work, and has been recognised by Ofsted (The Office for Standards in Education). At a recent meeting of the subject associations concerned with IT in Education it was stated by a senior official from Ofsted that responsibility for IT should be shared between a Network Manager, Head of Information Technology (the subject), and the ITC (ie the role we have defined and researched should be split into three) and that schools should have IT technicians. If this were the general pattern adopted by schools the problems of co-ordination would be reduced.

To conclude, it would be naive to assume that movement to a mixed delivery model, current Government initiatives and splitting the current role of the ITC in 3 will solve all the problems associated with co-ordinating IT in secondary schools, it may help, but co-ordination of IT will probably remain a major challenge into the future.

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