

# MANAGEMENT AND THE USE OF ICT IN SUBJECT TEACHING

## *Integration for Learning*

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**Abstract:** Improving teaching and learning in the classroom is the key issue facing educational leaders in UK secondary schools and information and communication technology (ICT) is being employed in a range of ways to support this endeavour. However, it is in everyday classrooms that the benefits of ICT for teaching and learning are most immediately felt and this is where the leadership vision will be secured. Many teachers feel the pressure to use ICT in their lessons but they are often faced with the problem of where and how it fits within existing teaching frameworks or understanding how it enriches pupils' classroom experiences. This paper argues that problems of ICT integration have a managerial dimension that relates to the planning and implementation of lessons. Drawing on experiences in science education, it presents frameworks that offer a means of analysing the beneficial features of ICT in relation to teaching and learning goals and identifying the skills of classroom application required to achieve these. It is suggested that many of these application skills find relevance in non-ICT activities that may be familiar and that teachers already possess professional skills that have relevance in ICT settings.

**Key words:** Integration, skills, teaching, learning

## 1. INTRODUCTION

Improving teaching and learning in the classroom is the key issue facing educational leaders in UK schools. The use of information and communication technology (ICT) in secondary school education is a focus of widespread interest. Developers of software and users of ICT often extol its virtues and some governments have invested high hopes (and significant

financial resources) in the anticipation that new technologies will deliver improvements in education. Yet, the use of ICT in classrooms is problematic and questions are beginning to be asked about exactly what ICT can deliver for education and how any benefits can be secured. This paper argues that integration of new technology into classroom practice is essentially a problem of management. It draws on experiences from science education in the England to tease out generic issues requiring a management focus for teachers employing ICT in subject teaching.

## **2. ICT AND ISSUES OF CHANGE**

The use of information and communication technology in education is characterised by change. To take some aspects of the UK experience by way of example, the early appearance of microcomputers in secondary schools in the 1980s allowed teachers to begin to harness the calculating power of these machines to serve teaching purposes. This was especially the case in science education where some teachers had the specialist technical knowledge (and interest) to develop the potential application of new technology in teaching. For example, by linking the computer directly to apparatus for the purposes of making experimental measurements it became possible to collect data for graphical display in software.

Rapid technical developments in the speed, memory and display properties of computer hardware together with concomitant developments in software (much of it tailor-made for the education market) now provide teachers with ICT resources of considerable sophistication and educational potential. However, in England, as elsewhere, developments in ICT have taken place in parallel with rafts of other educational reforms and initiatives and this has sometimes created a climate that has overshadowed teachers' use of ICT. This appears to have been true even where initiatives have been in tune with the educational potential of new technology (Newton and Rogers 2001).

In society as in schools, burgeoning technology has understandably resulted in the technology itself becoming a focus of strong interest. It is perhaps inevitable that the acquisition of the latest technology in schools has trailed that available in the High Street and in many homes. This may have some unforeseen effects in terms of pupils' motivational responses to working in school with older computer technology than they may have in their bedrooms (Keele University / National Council For Educational Technology (NCET) 1997); nevertheless it is a reality in many schools and likely to remain so in the foreseeable future.

The capacity of English schools to accommodate developments in new technology has been constrained by uneven levels of resource and by a lack of ICT confidence in a significant proportion of schoolteachers. The government has sought to address this deficit in skills through pre-service (Department for Education and Employment (DfEE) 1998) and in-service training initiatives (Teacher Training Agency (TTA) 1998). In the context of science teaching, barriers to ICT use have been described in three broad areas: Shortages in computers and related hardware; lack of teacher expertise and inclination (for some) to use computers coupled with a lack of access to machines to address these issues; and finally the lack of clarity of teaching purpose when faced with a wide range of possible options and generic software (Tebbutt 2000). In addition to these factors, Tebbutt raises the need to consider issues pertaining to teachers' workload and pupil characteristics, which might also influence adoption of ICT approaches in favour of non-ICT alternatives. Thus the development and integration of ICT for teaching purposes has proved to be more problematic than technophiles and politicians may have expected or wished. Uneven distribution of ICT resources, deficits in the necessary ICT skills and a lack of pedagogy for teaching subjects with ICT has each contributed to the complexity of integrating new technology into subject teaching.

### **3. INTEGRATION OF ICT - A MANAGEMENT PERSPECTIVE**

The use of ICT in subject teaching involves the integration into lessons of an innovative teaching tool. It is useful therefore to consider how scholarship on the management of educational innovation can illuminate integration of ICT into classroom practice. An authoritative source of such scholarship can be found in the work of Elliot Rogers (Rogers 1995). Rogers suggests that to better understand the implementation of an innovation, attention needs to be paid to the differences between the characteristics of people adopting innovations in addition to the features of the innovation itself. Moreover, scholars of innovation diffusion have seen an individual's perceptions of the attributes of an innovation as useful predictors of the rate of its adoption (Rogers 1995).

With particular reference to educational settings, Michael Fullan has described 'needs identification', 'goal clarity', 'complexity' and 'practicality' as key factors that affect successful implementation of an innovation (Fullan 1991). To develop the discussion further, needs identification raises questions about the relative importance of the innovation and what priority it should be given amongst other initiatives. In England

Management of Education in the Information Age

The Role of ICT

Selwood, I.D.; Fung, A.; O'Mahoney, C.D. (Eds.)

2003, X, 210 p., Hardcover

ISBN: 978-1-4020-7430-1