

Integration or transformation?

*A cross-national study of information and communication technology in
school education*

by

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Abstract

The advent of relatively cheap micro-computers in the 1980s has led to major investment in information and communication technology (ICT) for schools. The technology has been developed continually, creating a situation where there may be significant differences between policy and practice. The literature relating to innovation diffusion and the rationale for ICT in school education has concentrated upon effectiveness and teacher professional development. Existing models of development in the area are limited in scope or make ill-founded assumptions. Little work has been done on the question of alignment between policy and practice.

This study used a grounded theory approach to examine the relationships between policy, implementation and underlying models of development. This was done through a process of policy comparison, consultation with experts in the field and case study observations. The methodology used a comparative case study approach at national, school and classroom levels and examined issues such as the nature of development processes for policy in the area, implementation and practice in the use of computers in classrooms, teacher professional development and stages of development as perceived by practitioners. Data were gathered from the United States of America, England, Estonia and Australia from November 1999 to September 2002.

The study found ICT curriculum approaches for students were strongly aligned with a stage of development which emphasised the integration of ICT into existing curricula and current classroom practice. There was poor alignment between overlapping policies for teacher training and student learning outcomes and also between policy and classroom practice. It was confirmed that students generally have better access to computers outside school than within it, a situation largely ignored by policy. It was also found that experts in the field perceived increasing reliance upon generic office software as an outmoded 'tool' approach, and saw ICT as a 'driver' for transformative change in school education. School and classroom observations confirmed that local practice included transformative uses of ICT.

From these findings a general model of stages of development was derived. The model consisted of an introductory Phase 1, where students in school first use computers and information technology becomes a subject choice; an integrative Phase 2, where information and communication technologies are used to enhance learning opportunities in all traditional curriculum subject areas; and a transformative Phase 3, where the curriculum clearly includes topics of study that would not exist without information and communication technologies and schooling for most students no longer fits the traditional group-instruction model.

The model has implications for alignment in policy development based upon a national cross-curriculum framework. It demonstrates the importance for teacher professional development to include training in virtual teaching and the evaluation of digital materials. In particular, there is a need to examine the alignment between conventional learning outcomes, policy and practice when ICT is much more available to students outside school than within.

The study provides guidance for future policies concerning teacher ICT professional development and argues for their alignment with national cross-curriculum frameworks for ICT in school education. It will also be useful for educators training pre-service teachers to use and prepare online digital learning materials. Further, the study also informs school communities about the need to use ICT as a way of linking their institution with student homes and to extend learning opportunities.

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Glossary and acronyms

ABS	Australian Bureau of Statistics
ACCE	Australian Council for Computers in Education
ACOT	Apple Classrooms of Tomorrow
ACSA	Australian Curriculum Studies Association
AEC	Australian Education Council
ALTP	Arizona Learning Technology Partnership
Bandwidth	The communication capacity of a link between computers: measured in bits per second
Becta	British Education Communications and Technology Agency
Bit	Binary Digit: the smallest piece of data stored in a digital computer system
Broadband	Technically, a communication link which carries more than one kind of data at a time. Common usage for a link with bandwidth greater than 200 kbits/second in each direction
Byte	Sufficient bits to store a letter of the alphabet or similar character: generally 8 bits
CAD/CAM	Computer Aided Design/Computer Aided Manufacture
CARTS	Computerised Assessment Recording and Time-tabling System (Tasmania)
Computer	A universal machine for processing information
DETYA	Department of Education, Training and Youth Affairs (Commonwealth of Australia)
EC	European Community/European Commission
ECDL	<i>see</i> ICDL
EdNA	Education Network Australia
ERIC	Educational Resources Information Center (Syracuse University/Federal Department of Education, USA)
EU	European Union
FBI	Federal Bureau of Investigation (USA)
GCSE	General Certificate of Secondary Education (UK)
Hardware	Equipment comprising and associated with a computer system
HMI	Her Majesty's Inspectorate
IBM PC	International Business Machines Personal Computer or a clone thereof
ICDL/ECDL	International (European) Computer Driving Licence
ICT	Information and Communication Technology/ies
IEA	International Association for the Evaluation of Educational Achievement
ILS	Independent Learning System
INSET	In-service education and training
Internet	A network comprising connected computers around the world
IRT	In-school resource teacher (Tasmania, Australia)
ISTE	International Society for Technology in Education (USA)
IT	Information Technology
ITEC	Information Technology in Education and Children (UNESCO)
KEDI	Korean Educational Development Institute

KITO	Key Information Technology Outcomes (Australia)
KLAs	Key Learning Areas (Australia)
LCD	Liquid Crystal Display
MCEETYA	Ministerial Council on Education, Employment, Training and Youth Affairs (Australia)
MEP	Micro-Electronics Education Programme (UK)
MESU	Micro-electronics Education Support Unit
MOO	Multi-User Object-Oriented (a kind of multi-user role-playing environment)
NCATE	National Council for Accreditation of Teacher Education (USA)
NCES	National Center for Educational Statistics (USA)
NCET	National Council for Educational Technology (UK)
NCREL	North Central Regional Educational Laboratory (USA)
NCVQ	National Council for Vocational Qualifications (UK)
NETS	National Educational Technology Standards (USA)
NOIE	National Office for the Information Economy (Australia)
NSW DET	New South Wales Department of Education and Training
NSW HSC	New South Wales Higher School Certificate
OECD	Organisation for Economic Co-operation and Development
OFSTED	Office for Standards in Education (UK)
OHP	Over-Head Projector
PD	Professional Development
PHARE	Poland and Hungary: Action for the Restructuring of the Economy (EC)
PHARE-ISE	PHARE (see above) Information Systems in Education program
QCA	Qualifications and Curriculum Authority (England)
QUANGO	Quasi-autonomous non-governmental organisation
SACS	School Administration Computer System (Tasmania)
SCAA	School Curriculum and Assessment Authority (UK)
SITES	Second Information Technology in Education Study
Software	Instructions and data controlling the behaviour of a computer
TEFA	Technology Education Federation of Australia
TILT	Technology in Learning and Teaching (New South Wales, Australia)
TIMSS	Third International Mathematics and Science Study (IEA)
TLCF	Technology Literacy Challenge Fund
TLITE	Teaching and Learning in an Information Technology Environment (Canada)
TTA	Teacher Training Agency (UK)
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA or US	United States of America
UWS	University of Western Sydney
VET	Vocational Education and Training (Australia)
V-LAN	Virtual local area network
WebCT	Web Course Tools (commercial company)
WGU	Western Governors University (USA)
World wide web	Inter-linked information in hyper-text format on some internet computers
YCCI	Young Children's Computer Inventory Project