PEDAGOGY AND ICT USE IN SCHOOLS AROUND THE WORLD
FINDINGS FROM THE IEA SITES 2006 STUDY

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PEDAGOGY AND ICT USE
IN SCHOOLS AROUND THE WORLD
FINDINGS FROM THE IEA SITES 2006 STUDY

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# Contents

List of Tables ................................................................. xiii
List of Figures ................................................................. xvii
List of Boxes ................................................................. xxi
List of Appendices ......................................................... xxiii
List of Online Appendices ................................................ xxiii
Abbreviations ................................................................. xxvii
Acknowledgements ........................................................... xxix
Series Editor’s Foreword ................................................... xxxi
Foreword by Niki Davis ..................................................... xxxiii

## Chapter One: Introduction to SITES 2006

*Willem PELGRUM and Nancy LAW*

1.1 Previous SITES modules .................................................. 2
   1.1.1 SITES Module 1 .................................................. 2
   1.1.2 SITES-M2 ..................................................... 7
1.2 SITES 2006 in brief ....................................................... 9
1.3 Countries participating in SITES 2006 .............................. 10
1.4 Outline of this book ...................................................... 10

## Chapter Two: Study Design and Methodology

*Nancy LAW, Willem PELGRUM, Christian MONSEUR, Falk BRESE, Ralph CARSTENS, Joke VOOGT, Tjeerd PLOMP and Ronald E. ANDERSON*

2.1 Emerging pedagogies for lifelong learning and connectedness in the 21st century .................................................. 16
2.2 Conceptual framework and research questions ..................... 18
   2.2.1 Conceptual framework ....................................... 18
   2.2.2 Research questions ........................................... 19
2.3 Design of the survey instruments  
2.3.1 Teacher questionnaire (core component)  
2.3.2 Teacher questionnaire (optional component)  
2.3.3 School questionnaires  
2.3.4 The national context questionnaire  
2.3.5 The instrument design process  

2.4 Sampling  

2.5 The field trial  

2.6 Online data collection  

2.7 Methodological issues  
2.7.1 Development and reliability of scale indicators  
2.7.2 Reporting standards for IEA studies  

2.8 Summary  

Chapter Three: National Contexts  
Ronald E. ANDERSON and Tjeerd PLOMP  

3.1 Research questions relating to the four spheres  
3.1.1 Demographics  
3.1.2 Structure of the education systems  
3.1.3 Pedagogy  
3.1.4 ICT-related policy and activities  

3.2 Methods overview  

3.3 Within-sphere (univariate) findings  
3.3.1 Pedagogy  
3.3.2 Structure of the education systems  
3.3.3 Pedagogy and curriculum  
3.3.4 ICT  

3.4 National policies for ICT and pedagogical reform  
3.4.1 Alberta, Canada  
3.4.2 Catalonia, Spain  
3.4.3 Chile  
3.4.4 Chinese Taipei  
3.4.5 Denmark  
3.4.6 Estonia  
3.4.7 Finland
3.4.8 France 59
3.4.9 Hong Kong SAR 59
3.4.10 Israel 59
3.4.11 Italy 60
3.4.12 Japan 60
3.4.13 Lithuania 61
3.4.14 Moscow City, Russian Federation 61
3.4.15 Norway 62
3.4.16 Ontario, Canada 62
3.4.17 Russian Federation 62
3.4.18 Singapore 63
3.4.19 Slovak Republic 64
3.4.20 Slovenia 64
3.4.21 South Africa 64
3.4.22 Thailand 65

3.5 Conclusions 65

Chapter Four: School Practices and Conditions for Pedagogy and ICT

Willem PELGRUM

4.1 Introduction 67

4.2 Conditions at the school level 68
  4.2.1 Vision 68
  4.2.2 Infrastructure (hardware and software) 74
  4.2.3 Support (technical and pedagogical) 90
  4.2.4 Staff development 94
  4.2.5 Leadership development priorities 101
  4.2.6 Organization and management 104

4.3 School principals’ perceptions of the presence of lifelong learning pedagogy in schools: A comparison between 1998 and 2006 108

4.4 Relationships between school-level conditions 114

4.5 Summary 118
  4.5.1 Pedagogical practices 118
  4.5.2 Vision of school leaders on pedagogy and ICT 118
  4.5.3 Infrastructure 119
  4.5.4 Pedagogical and technical support 119
Chapter Five: Pedagogical Orientations in Mathematics and Science and the Use of ICT

Nancy LAW and Angela CHOW

5.1 Pedagogical orientations of mathematics and science teachers around the world
   5.1.1 Pedagogical-practice orientations as reflected in teachers’ espoused curriculum goals
   5.1.2 Pedagogical-practice orientations as reflected in teachers’ practices
   5.1.3 Pedagogical-practice orientations as reflected in teachers’ reports of students’ practices
   5.1.4 Comparing the teacher-practice and student-practice orientations

5.2 ICT-using pedagogical orientations of mathematics teachers and science teachers
   5.2.1 ICT-using teacher practices
   5.2.2 ICT-using student practices
   5.2.3 Comparing overall and ICT-using teacher-practice orientations
   5.2.4 Comparing overall and ICT-using student-practice orientations

5.3 Organization of pedagogical activities, learning resources, assessment practices, and ICT-use
   5.3.1 Types of pedagogical activities
   5.3.2 Teachers and students not together in the same place and/or at the same time when learning takes place
   5.3.3 Learning resources
   5.3.4 Methods of assessing students’ learning outcomes and use of ICT during that process

5.4 Extent and perceived impacts of ICT-use on teaching and learning
   5.4.1 Prevalence of ICT-use in mathematics classrooms and science classrooms
5.4.2 Teachers’ perceived impact of ICT-use on self 170
5.4.3 Impact of ICT-use on students as perceived by mathematics teachers and science teachers 172
5.4.4 Teachers’ pedagogical orientation relative to teachers’ perceptions of impact of ICT-use on students 175

5.5 Summary 177

Chapter Six: Teacher Characteristics, Contextual Factors, and How These Affect the Pedagogical Use of ICT

_Nancy Law and Angela Chow_

6.1 Teachers’ demographic characteristics and pedagogical uses of ICT 182
   6.1.1 Teachers’ age 182
   6.1.2 Teachers’ gender 186
   6.1.3 Teachers’ qualifications 188
   6.1.4 Teachers’ self-reported technical and pedagogical competence in ICT-use 191

6.2 Organizational and system-level conditions influencing ICT-use 194
   6.2.1 Teachers’ attendance and desire to participate in ICT-related professional development activities 194
   6.2.2 Obstacles to pedagogical ICT-use as perceived by teachers 198
   6.2.3 Presence of a community of practice in the school as perceived by teachers 203

6.3 Further explorations of factors influencing teachers’ use of ICT 206
   6.3.1 Teachers’ ICT-competence 207
   6.3.2 Attendance in ICT-related professional development activities 207
   6.3.3 Obstacles to adopting ICT in teaching 209
   6.3.4 Perceived presence of a community of practice 210

6.4 Teachers’ pedagogical-practice orientations and their use of ICT in teaching 211

6.5 Teachers’ vision of pedagogical use of ICT in the future 214

6.6 Summary 217
Chapter Seven: Satisfying Pedagogical Practices Using ICT

Joke VOOGT

7.1 Background to this research component 222
7.2 Design of the international option 223
7.3 Some illustrative examples 226
7.4 Extent of use 229
7.5 Changes in student outcomes 229
7.6 Changes in teaching practices 234
7.7 Person initiating teaching and learning aspects 240
7.8 Summary 244

Chapter Eight: In Search of Explanations

Nancy LAW

8.1 Correlational analysis of ICT-using teacher practices with school-level conditions at the system level 251
8.2 Multilevel modeling of ICT-using teacher practices and school-level conditions
   8.2.1 Multilevel modeling on hierarchical data 254
   8.2.2 Three-level modeling of teachers’ ICT-TP-LLL orientation scores on individual school-level factors 255
   8.2.3 Three-level modeling of teachers’ ICT-TP-LLL orientation scores on all six school-level factors 258
8.3 Summary 261

Chapter Nine: Summary and Reflections

Nancy LAW

9.1 Summary of key findings at teacher, school, and system levels
   9.1.1 Contextual factors pertinent to ICT-use and pedagogical innovation 265
   9.1.2 Pedagogical practices and ICT-use 268
   9.1.3 Impact of ICT-use on students’ and teachers’ pedagogical orientation 271
9.1.4 Relationships between pedagogy, ICT-use, and school-level factors as perceived by teachers

9.1.5 Relationships between ICT-using teacher practices and school-level factors at the system level

9.1.6 Relationships between teachers’ pedagogical orientation toward ICT-using practices and the contextual conditions at their schools

9.2 Key findings and policy implications

9.2.1 Key findings

9.2.2 Implications of the SITES 2006 findings for ICT-related education policies

References

Notes on the Authors

Appendix A

Appendix B

Appendix C
List of Tables

Table 1.1 Education systems that participated in SITES 2006 ............................... 10
Table 2.1 Indicators included in the teacher questionnaire and the corresponding question number .......................... 23
Table 2.2 Summary of the contents of the school questionnaires ......................................................... 27
Table 3.1 Demographic factors by country (education system) .......................... 42
Table 3.2 Structural factors by education system .......................... 44
Table 3.2 Structural factors by education system (Continued) .......................... 45
Table 3.3 Pedagogical factors by education system .......................... 48
Table 3.3 Pedagogical factors by education system (Continued) .......................... 49
Table 3.4 ICT factors by education system ......................................................... 54
Table 3.4 ICT factors by education system (Continued) ......................................................... 55
Table 4.1 Vision of school leaders regarding pedagogy (mean (s.e.)) ...................... 70
Table 4.2 Percentages (s) of school leaders indicating that ICT-use is very important for achieving specified pedagogical objectives ......................................................... 73
Table 4.3 Percentages (standard errors) of schools in 1998 and 2006 able to provide Grade 8 students with access to computers and percentages of these schools with access to internet ......................................................... 75
Table 4.4 Percentages (standard errors) of schools that possessed a certain quantity of projectors (“beamers”) for presentation of digital materials ......................................................... 79
Table 4.5 Percentages (standard errors) of schools in which common types of technology applications and facilities were available ......................................................... 81
Table 4.6 Percentages (standard errors) of technology coordinators indicating that common types of technology applications and facilities were not available but needed ......................................................... 83
Table 4.7  Percentages (standard errors) of school principals giving high priority to a number of infrastructure-related issues .......................................................... 84

Table 4.8  Percentages (standard errors) of technology coordinators indicating that the school’s capacity to realize its pedagogical goals was hindered “a lot” by each of the obstacles listed ......................................................... 87

Table 4.9  Percentages (standard errors) of technology coordinators reporting where computers were located in their school* .............................................................. 89

Table 4.10 Percentages (standard errors) of technology coordinators indicating the maintenance options available in their schools ......................................................... 90

Table 4.11 Percentages of schools where specific categories of persons are involved in providing technical support … 92

Table 4.12 Average percentages (across education systems) of school principals marking obstacles hindering realization of the school’s pedagogical goals “a lot” ….. 96

Table 4.13 Percentages (standard errors) of schools requiring acquisition of knowledge and skills in the listed topics 98

Table 4.14 Percentages (standard errors) of schools using particular channels for teachers to acquire knowledge and skills ............................................................. 99

Table 4.15 Percentages (standard errors) of schools where different types of courses were available for teachers, internally and/or externally ............................................ 100

Table 4.15 Percentages (standard errors) of schools where different types of courses were available for teachers, internally and/or externally (Continued) ...................... 101

Table 4.16 Percentages (standard errors) of schools expressing a high priority for training in several areas ......................... 102

Table 4.16 Percentages (standard errors) of schools expressing a high priority for training in several areas (Continued) .. 103

Table 4.17 Percentages (s.e.) of schools that had taken particular measures relating to management/organizational issues 106

Table 4.18 Percentages (standard errors) of schools that had taken particular organizational actions .......................... 107
Table 4.19  Percentages (standard errors) of schools that had taken particular actions (monthly or weekly) regarding internal and external communication .......................... 108

Table 4.19  Percentages (standard errors) of schools that had taken particular actions (monthly or weekly) regarding internal and external communication (Continued) ...... 109

Table 4.20  Correlations between school-level indicators aggregated at the system level (including only those education systems which met the sampling standards) .............. 116

Table 5.1a  Listing of how often, on average, the mathematics teachers of each system practiced different methods of organizing teaching and learning activities .................... 152

Table 5.1b  Listing of how often, on average, the science teachers of each system practiced different methods of organizing teaching and learning activities ...................... 153

Table 5.2  Frequency with which mathematics teachers were using different learning resources and tools in the target class .................................................... 160

Table 5.3  Correlations of system means of teacher-practice-orientation scores with corresponding mean impact scores of ICT-use on students as perceived by science teachers .......................................................... 176

Table 6.1a  Number of mathematics teachers in the different age groups and the percentage of mathematics teachers in each age group who had used ICT with their target classes ........................................... 184

Table 6.1b  Number of science teachers in the different age groups and the percentage of science teachers in each age group who had used ICT with their target classes ....... 185

Table 6.2  Number of male teachers and female teachers and the percentage of teachers in each gender group who used ICT with their target classes ........................................ 187

Table 6.3  Number of mathematics teachers with different educational qualifications and the percentage of teachers in each qualification category who had used ICT with their target classes .......................................... 190
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4</td>
<td>Odds ratios and the levels of statistical significance emerging from the binary logistics regression analysis of the relationship between personal and contextual factors (as perceived by mathematics teachers) and mathematics teachers’ pedagogical ICT-use</td>
<td>208</td>
</tr>
<tr>
<td>6.5</td>
<td>Odds ratios for the nine pedagogical-orientation scores and the levels of statistical significance that emerged from the binary logistics regression analysis of mathematics teachers’ pedagogical ICT-use</td>
<td>213</td>
</tr>
<tr>
<td>7.1</td>
<td>Increase in aspects of student outcomes; comparison of perceptions of mathematics teachers and science teachers who were using ICT on a weekly basis and those who were using ICT during a specific period in the school year (% and (s.e.))</td>
<td>234</td>
</tr>
<tr>
<td>7.2</td>
<td>Mathematics teachers who perceived increases in student outcomes (% and (s.e.))</td>
<td>236</td>
</tr>
<tr>
<td>7.3</td>
<td>Increase in aspects of teaching; comparison of perceptions of mathematics and science teachers who were using ICT on a weekly basis and those teachers using ICT during a specific period of the school year (% and (s.e.))</td>
<td>239</td>
</tr>
<tr>
<td>7.4</td>
<td>Mathematics teachers’ perceptions of changes (increase) in teaching practices (% and (s.e.))</td>
<td>241</td>
</tr>
<tr>
<td>7.5</td>
<td>Student as initiator of aspects of teaching and learning; comparison of perceptions of mathematics teachers and science teachers who were using ICT on a weekly basis with those teachers who were using ICT during a specific period of the school year (% and (s.e.))</td>
<td>244</td>
</tr>
<tr>
<td>7.6</td>
<td>Mathematics teachers’ perceptions of student as initiator in various aspects of teaching and learning (% and (SE))</td>
<td>245</td>
</tr>
<tr>
<td>8.1</td>
<td>Correlations of system-level means of specified school-level factors and the ICT-using teacher-practice orientations of science teachers</td>
<td>252</td>
</tr>
<tr>
<td>8.2</td>
<td>Summary of key results for the six single-factor three-level analyses</td>
<td>257</td>
</tr>
<tr>
<td>8.3</td>
<td>Summary of the key results in the three-level analysis with six school factors and one system variable</td>
<td>261</td>
</tr>
</tbody>
</table>
List of Figures

Figure 2.1 Overall conceptual framework for SITES 2006 .......... 19
Figure 3.1 Four spheres of contextual factors ........................ 38
Figure 4.1 Means and confidence intervals for an indicator of lifelong-learning ICT-vision ................................. 71
Figure 4.2 Percentages of schools falling within five student–computer ratio categories ................................. 76
Figure 4.3 Percentages of technology coordinators who perceived the insufficient number of computers connected to the internet as hindering “to a great extent” realization of their pedagogical goals, broken down by student internet-computer-ratio categories ........ 86
Figure 4.4 Means (across items) and confidence intervals of the extent to which technology coordinators reported that technical support was available for teachers ...... 93
Figure 4.5 Means (across items) and confidence intervals of the extent to which school leaders reported that pedagogical support was available for teachers ............... 95
Figure 4.6 Percentages of school principals averaged across a set of items indicating “a lot” of presence of emerging pedagogy in SITES–M1 (1998) and SITES 2006 (2006) 111
Figure 4.7 Mean score on indicators of the lifelong-learning vision of school principals and perceived presence of this pedagogical paradigm ................................. 113
Figure 4.8 Mean score on indicators of presence of lifelong-learning-oriented practices (by school principals) and perceptions of students’ engagement in these types of activities by teachers ........................................ 114
Figure 4.9 Mean score on indicators of lifelong-learning-pedagogical vision and the number of years education systems had experience with ICT .......... 117
| Figure 5.1 | Mathematics teachers’ and science teachers’ pedagogical-practice orientations as reflected in their espoused curriculum goals | 126 |
| Figure 5.2 | Pedagogical-practice orientations as reflected in mathematics teachers’ and science teachers’ practices | 129 |
| Figure 5.3 | Pedagogical-practice orientations as reflected in students’ practices and reported by mathematics teachers and science teachers | 135 |
| Figure 5.4 | Radar diagrams for comparisons of pedagogical orientations across indicator sets and systems | 136 |
| Figure 5.5 | Radar diagrams showing the teacher-practice and student-practice orientation scores for science teachers in each of the participating systems | 138 |
| Figure 5.5 | Radar diagrams showing the teacher-practice and student-practice orientation scores for science teachers in each of the participating systems (Continued) | 139 |
| Figure 5.6 | Mean ICT-using teacher-practice orientations reported by mathematics teachers and science teachers | 141 |
| Figure 5.7 | Mean ICT-using student-practice orientations reported by mathematics teachers and science teachers | 142 |
| Figure 5.8 | Radar diagrams on the overall and ICT-using teacher practices for science teachers in each of the participating systems | 144 |
| Figure 5.8 | Radar diagrams on the overall and ICT-using teacher practices for science teachers in each of the participating systems (Continued) | 145 |
| Figure 5.9 | Radar diagrams on the overall and ICT-using student practices for science teachers in each of the participating systems | 148 |
| Figure 5.9 | Radar diagrams on the overall and ICT-using student practices for science teachers in each of the participating systems (Continued) | 149 |
| Figure 5.10 | Mean frequencies of separation of learners and teachers in space and time in different teaching and learning situations as reported by mathematics teachers and science teachers | 157 |
| Figure 5.11 | Mean percentages of mathematics teachers and science teachers using the three types of assessment methods | 163 |
Figure 5.12 Mean percentages of mathematics teachers and science teachers using ICT in each of the three types of assessment methods ........................................ 166

Figure 5.13 Percentages of mathematics teachers and science teachers reporting having used ICT in the teaching and learning activities of their target classes ............. 169

Figure 5.14 Mathematics teachers’ and science teachers’ perceived impact of ICT-use on themselves .................. 171

Figure 5.15 Mathematics teachers’ and science teachers’ perceptions of extent of various kinds of impact of ICT-use on students ......................................................... 174

Figure 6.1 Mathematics teachers’ and science teachers’ self-reported technical and pedagogical ICT-competence 193

Figure 6.2 Scatterplots of percentages of mathematics teachers’ reported use of ICT with their target class and their mean levels of self-reported technical and pedagogical ICT-competence ............................................. 195

Figure 6.3 Teachers’ participation in professional development activities .................................................. 197

Figure 6.4 Mean percentages of obstacles within each of the three categories that mathematics teachers and science teachers reported experiencing ..................... 201

Figure 6.5 Scatterplots of the percentages of science teachers’ reported use of ICT with their target class versus the mean percentages of each of the three kinds of obstacles experienced by science teachers when using ICT in the participating systems ........................................ 202

Figure 6.6 Mathematics teachers’ and science teachers’ perceptions of presence of different aspects of a community of practice in their schools ............................. 205

Figure 6.7 Association between mathematics teachers’ and science teachers’ pedagogical-practice orientations and their vision for ICT-use in the coming two years ............................. 215

Figure 6.8 Scatterplot of the percentage of science teachers reporting using ICT with their target class relative to their mean-reported priority for ICT-use in the coming two years ............................................. 216

Figure 7.1a Extent and modes of extensive use of ICT by mathematics teachers .................................................. 230
Figure 7.1b  Extent and modes of extensive use of ICT by science teachers ......................................................... 231
Figure 7.2a  Mathematics teachers’ perceptions of changes in student outcomes due to ICT ........................................ 232
Figure 7.2b  Science teachers’ perceptions of changes in student outcomes due to ICT ............................................. 233
Figure 7.3a  Mathematics teachers’ perceptions of changes in teaching practices due to ICT use in the specified pedagogical activity ......................................................... 237
Figure 7.3b  Science teachers’ perceptions of changes in teaching practices due to ICT use in the specified pedagogical activity ................................................................. 238
Figure 7.4a  Mathematics teachers’ identification of person initiating aspects of teaching and learning .................. 242
Figure 7.4b  Science teachers’ identification of person initiating aspects of teaching and learning ........................... 243
Figure 7.5  Percentages of mathematics teachers reporting that their Grade 8 students initiated the content and learning goals of the specified pedagogical activity ... 246
Figure 7.6  Percentages of mathematics teachers reporting that their Grade 8 students initiated determination of the location, planning of time, and time needed for learning content related to the specified pedagogical activity ......................................................... 247
Figure 7.7  Percentages of mathematics teachers reporting that their Grade 8 students initiated getting started on, choosing learning resources for, organizing grouping, and choosing learning activities related to the specified pedagogical activity ................................. 248
Figure 7.8  Percentages of mathematics teachers reporting that their Grade 8 students initiated deciding when to take a test, demonstrate achievement, monitor progress, and provide feedback in relation to the specified pedagogical practice ................................................. 249
List of Boxes

Box 1.1 Types of pedagogical practices examined in SITES-M1 .... 5
Box 4.1 Question to school principals about resource priorities ... 85
Box 5.1 List of curriculum-goal items contributing to the three goal-orientation scores ........................................ 124
Box 5.2 List of teacher practices associated with the three teacher-practice orientations .................................. 127
Box 5.3 List of items pertaining to the three student practices ... 131
Box 5.4 List of assessment methods included in the teacher questionnaire ..................................................... 162
Box 5.5 Kinds of impact of ICT-use on teachers ......................... 170
Box 5.6 Kinds of impact of ICT-use on students ......................... 173
Box 6.1 Technical and pedagogical professional development activities listed in the teacher questionnaire .............. 196
Box 6.2 The three categories of obstacles experienced by teachers in their use of ICT in teaching .............................. 199
Box 6.3 Different aspects of the presence of a community of practice in schools ................................................ 204
Box 6.4 Areas of priority for use of ICT in the next two years listed according to the pedagogical-practice orientations evident within these areas ........................................... 214
Box 7.1 Overview of pedagogy in an industrial society versus an information society ........................................ 224
Box 7.2 Instruction for the description of most satisfying pedagogical practice ............................................... 225
Box 7.3 Examples of most-satisfying pedagogical practices in mathematics from countries participating in the international option ...................................................... 227
Box 7.4 Examples of most-satisfying pedagogical practices in science from countries participating in the international option .......................................................... 228
Box 8.1 Meaning of the abbreviations for the six school-level predictors included in the multilevel analysis models ... 255
# List of Appendices

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>SITES 2006 Personnel</td>
<td>289</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Systems participating in the three SITES modules</td>
<td>294</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Binary logistic regression</td>
<td>295</td>
</tr>
</tbody>
</table>

# List of Online Appendices

Due to the limitation of space, some analysis results are not presented in the printed version of the report, but are made available online at http://www.sites2006.net/appendix. The following is the list of online appendices, including (a) the list of survey questionnaires, (b) the list of online tables of results, and (c) the list of online figures of results.

## List of survey questionnaires

- **WQ1** Questionnaire for National Research Coordinators
- **WQ2** Principal Questionnaire
- **WQ3** Technical Questionnaire
- **WQ4** Teacher Questionnaire

## List of online tables of results

- **Table W4.1** Percentages of schools per student-Internet-computer ratio category (only for schools possessing computers)
- **Table W4.2** Development of student-computer ratio’s between 1998 and 2006
Table W4.3 | Percentages (standard errors) of schools where certain numbers (0, 1, 2-5, or more than 5) PDAs, graphical calculators or smart boards where available

Table W4.4 | Percentages (standard errors) of schools where certain percentages of students (<10%, 10-24%, etc.) brought their own PDA, graphical calculator or laptop to school

Table W4.5 | Percentages (standard errors) of school principals indicating “a lot” of presence of approaches reflected in items underlying the indicator shown in Figure 4.6

Table W5.2S | Frequency with which science teachers were using different learning resources and tools in the target class

Table W5.3M | Correlations of system means of teacher-practice-orientation scores with corresponding mean impact scores of ICT-use on students as perceived by mathematics teachers

Table W6.3S | Number of science teachers with different educational qualifications and the percentage of teachers in each qualification category who had used ICT with their target classes

Table W6.4S | Odds ratios and the levels of statistical significance emerging from the binary logistics regression analysis of the relationship between personal and contextual factors (as perceived by science teachers) and science teachers’ pedagogical ICT-use

Table W6.5S | Odds ratios for the nine pedagogical-orientation scores and the levels of statistical significance that emerged from the binary logistics regression analysis of science teachers’ pedagogical ICT-use

Table W7.2S | Science teachers who perceived increases in student outcomes (% and (s.e.))

Table W7.4S | Science teachers’ perceptions of changes (increase) in teaching practices (% and (s.e.))

Table W7.6S | Science teachers’ perceptions of student as initiator in various aspects of teaching and learning (% and (s.e.))
List of online figures of results

Figure W5.5M  Radar diagrams showing the teacher-practice and student-practice orientation scores in the subject of mathematics for each of the participating systems

Figure W5.5M  Radar diagrams showing the teacher-practice and student-practice orientation scores in the subject of mathematics for each of the participating systems (Continued)

Figure W5.8M  Radar diagrams on the overall and ICT-using teacher practices in the subject of Mathematics for each of the participating systems

Figure W5.8M  Radar diagrams on the overall and ICT-using teacher practices in the subject of Mathematics for each of the participating systems (Continued)

Figure W5.9M  Radar diagrams on the overall and ICT-using student practices in the subject of Mathematics for each of the participating systems

Figure W5.9M  Radar diagrams on the overall and ICT-using student practices in the subject of Mathematics for each of the participating systems (Continued)

Figure W6.2S  Scatterplots of percentages of science teachers’ reported use of ICT with their target class and their mean levels of self-reported technical and pedagogical ICT-competence

Figure W6.5M  Scatterplots of the percentages of mathematics teachers’ reported use of ICT with their target class versus the mean percentages of each of the three kinds of obstacles experienced by science teachers when using ICT in the participating systems

Figure W6.8M  Scatterplot of the percentage of mathematics teachers reporting using ICT with their target class relative to their mean-reported priority for ICT-use in the coming two years
Figure W7.5S  Percentages of science teachers reporting that their Grade 8 students initiated the content and learning goals of the specified pedagogical activity

Figure W7.6S  Percentages of science teachers reporting that their Grade 8 students initiated determination of the location, planning of time, and time needed for learning content related to the specified pedagogical activity

Figure W7.7S  Percentages of science teachers reporting that their Grade 8 students initiated getting started on, choosing learning resources for, organizing grouping, and choosing learning activities related to the specified pedagogical activity

Figure W7.8S  Percentages of science teachers reporting that their Grade 8 students initiated deciding when to take a test, demonstrate achievement, monitor progress, and provide feedback in relation to the specified pedagogical practice
Abbreviations

BECTA  British Educational Communications and Technology Agency
CAB    Alberta Province, Canada
CAD    computer-aided design
CFA    confirmatory factor analysis
CHL    Chile
COP    community of practice
COT    Ontario Province, Canada
DNK    Denmark
DPC    IEA Data Processing and Research Center
ECT    Catalonia, Spain
EMB    Education and Manpower Bureau of Hong Kong
ERT    European Roundtable of Industrialists
EST    Estonia
EU     European Union
FIN    Finland
FRA    France
GDP    gross domestic product
GIS    geographic information system
HKG    Hong Kong SAR
HLM    Hierarchical Linear and Nonlinear Modelling
ICC    international coordinating committee
ICT    information and communication technology
ICT-EXP Mean length of experience that schools in a system had with using ICT for pedagogical practices
ICT-TP-LLL score for ICT-using teacher practices oriented towards promoting lifelong learning
IEA    International Association for the Evaluation of Educational Achievement
ISCED  International Standard Classification of Education
ISR    Israel
IT     information technology
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ITA</td>
<td>Italy</td>
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<td>JPN</td>
<td>Japan</td>
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<tr>
<td>LEADERSHIP</td>
<td>Principal’s priority for leadership development</td>
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<td>LLL</td>
<td>lifelong learning</td>
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<td>LMS</td>
<td>learning management system</td>
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<td>LTU</td>
<td>Lithuania</td>
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<td>MPITE</td>
<td>Masterplan for IT in Education (Singapore)</td>
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<td>NCES</td>
<td>National Center for Educational Statistics</td>
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<td>NCQ</td>
<td>national coordinator questionnaire</td>
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<td>NOR</td>
<td>Norway</td>
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<td>NRC</td>
<td>national research coordinator</td>
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<td>ODC</td>
<td>online data collection</td>
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<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>PC</td>
<td>personal computer</td>
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<td>PD</td>
<td>professional development</td>
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<td>PDA</td>
<td>personal digital assistant</td>
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<td>PEDASUP</td>
<td>level of pedagogical support</td>
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<td>PISA</td>
<td>Programme for International Student Assessment</td>
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<td>PSTD</td>
<td>Programma di sviluppo delle tecnologie didattiche</td>
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<td>RUM</td>
<td>Moscow, Russian Federation</td>
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<td>RUS</td>
<td>Russian Federation</td>
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<td>SAR</td>
<td>Special Administrative Region</td>
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Acknowledgements

From the Executive Director of the IEA, Dr Hans Wagemaker

The International Association for the Evaluation of Educational Achievement (IEA) has, for 50 years, conducted comparative research studies focusing on educational policies, practices and outcomes in more than 90 countries around the world. Organized around a secretariat located in Amsterdam, the Netherlands, and a data-processing center in Hamburg, Germany, the IEA, through its various projects, continues to study and report on widely varying topics and subject matters, including the use and impact of information technology in education. This volume reports the outcome of the IEA’s most recent study in this area.

The IEA is particularly indebted to the directors of this project, Professor Nancy Law, Professor Tjeerd Plomp, and Dr Hans Pelgrum, for their leadership. We also strongly acknowledge the guidance provided by the members of the steering committee. Projects like SITES are not possible without a considerable amount of financial support. In this regard, I thank the Ford Foundation, the countries that contributed financially to this project and, in particular, the governments of Norway and Japan for their financial input. Also critical to the success of international projects such as SITES is the willingness of participating countries to commit to a set of common goals and procedures. Many teachers and principals gave willingly of their time, and for that I and my secretariat colleagues are continually thankful. Finally, I extend particular and sincere thanks to the national research coordinators, whose input has made this project a success and this volume possible.

From the Volume Editors and Authors

The international collaborative effort that is SITES 2006 was made possible through the contribution of many persons. We thank the NRCs of the 22 education systems that participated in this study (Appendix A gives names and contact details). They contributed substantially to its design, including questionnaire development. They also translated the instruments (where necessary) and collected the data from schools and teachers in their countries. We greatly appreciate the cooperation of the
Acknowledgements

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schools (roughly 9,000), their principals, and the technology coordinators and teachers (around 35,000). The international coordination of SITES 2006 was run by a consortium consisting of (1) an international coordination centre at the University of Twente (Tjeerd Plomp, study director, and W. J. Pelgrum, international coordinator), (2) the University of Hong Kong (Nancy Law and her team at the Centre for Information Technology in Education, University of Hong Kong), and (3) the IEA Data Processing and Research Center (DPC) in Hamburg.

We express our sincere thanks to Christian Monseur, University of Liège, the sampling coordinator for the study, and to our colleagues at the DPC for their expertise throughout SITES 2006. In particular, we acknowledge the DPC for designing an online data collection (ODC) system that proved very well tailored for this large-scale international comparative study. This system marked the first use of ODC in the history of international comparative assessments. We also greatly appreciate the many thoughtful suggestions received at various stages of the study from Ronald Anderson and Alfons ten Brummelhuis as members of the study’s international steering committee. We are particularly grateful to the gracious hospitality of our hosts during NRC meetings held outside of the study consortium: Pornpun Waitayangkoon, Somsri Tangmongkolcert (Phuket, Thailand), Renata Picco, and Roberto Melchiori (Frascati, Italy).

We furthermore appreciate the contribution of the IEA secretariat, in particular, Barbara Malak, for running the translation verifications of the questionnaires used in each participating system. The advice given by the IEA editorial committee, in particular, from David Robitaille, University of British Columbia, helped us fine-tune the structure and style of the writing in this book, and thereby contributed much to its improvement over earlier drafts. Paula Wagemaker worked under great time pressure and did an excellent copyediting job on the manuscript. We also acknowledge our colleagues at our own institutions. S. Schele at the University of Twente helped format some of the tables and figures. Angela Chow, Cindy Yip, Albert Chan, and Man-Wai Lee at the University of Hong Kong contributed to the data-analysis; Albert Chan put in great efforts designing the table and figure format and did most of the formatting and layout of the manuscript; and Clement Ng designed the cover of this book. Finally, we express our gratitude to the Ford Foundation and the participating national centers for financing the international overhead costs of this study.
Series Editor’s Foreword

The International Association for the Evaluation of Academic Achievement, or IEA, conducts studies in countries across the world that are explicitly comparative, but although this might be the first reason to welcome this volume into the CERC Studies in Comparative Education Series, it is certainly not the last. This book reports and analyses the findings of the Second Information Technology in Education Study (SITES 2006), which was conducted under the auspices of the IEA. This is the first time that a book in this series has been solely dedicated to an IEA study, so why have we decided to publish this one in particular? Well, perhaps it’s about time. One of the earliest volumes in the series – the sixth, in fact, published in 1999 – was Neville Postlethwaite’s International Studies of Educational Achievement: Methodological Issues. Seventeen volumes and nine years later, we’re publishing one such study. Postlethwaite’s introduction to international survey studies and engagement with methodological issues that included sampling, instrument construction, and data collection, management and analysis, contributed critical insights to this highly significant and substantial field of comparative education research, and is today viewed as one of the key methodological texts in the field. This study, reported by Nancy Law, Willem Pelgrum and Tjeerd Plomp, represents the best of what Postlethwaite set down. The editors of this book are widely recognized as among the leading scholars globally in the field of information and communications technology (ICT) in education. And Nancy Law’s Centre for Information Technology in Education (CITE) is recognized as a leading academic centre in the field.

One of the consequences of the increasing rate of globalization has been a reconsideration of national goals of education, which in some cases has contributed to national declarations of educational purposes that indicate an apparent need for education to go beyond the teaching of knowledge and skills to preparing younger generations to contribute to innovation and problem solving as members of a team. Such changes in educational goals have also brought about changes in methods of organizing and conducting teaching and of enhancing learning, as well
as changes in roles played by teachers and learners. This book reports on a comparative study of ICT in education in the context of such global changes in policies and practices in education. Hence it is as much a book on pedagogy and changes in educational goals and practices as it is a book on ICT. The findings reported in this book will be valuable for education policy makers, practitioners, researchers and anyone else interested in understanding the changes in pedagogical practices in classrooms around the world, and the roles played by ICT in those changes. The book also sheds light on how policies and strategies at the school and system levels might influence whether and how ICT is to be used in classrooms.

In the Series Editor’s Foreword to the previous volume published in this series, a month prior to the publication of this volume, I mentioned that CERC has recently been described, by the Co-Editor of the *Comparative Education Review*, David Post, as “one of the world’s most important publishers of research in the field of comparative education”. This volume, in its application of comparative education’s research methods to the field of information and communications technology in education, is yet another reason why.

Mark Mason

Editor

*CERC Studies in Comparative Education* Series

Director

Comparative Education Research Centre

The University of Hong Kong
How is information and communication technology (ICT) changing teaching and learning practices in secondary schools worldwide in the 21st-century? This is the central question addressed by researchers involved in the series of surveys comprising the Second Information Technology in Education Study (SITES). The question is a multifaceted one, with each facet raising additional questions relating to both theory and practice. These include the following:

- What traditional and new pedagogies are evident in the 21st century?
- What is the role of ICT in the teaching and learning process?
- What ICT-infrastructure is available in schools?
- How can teachers and their administrators be prepared for effective practice?
- How have these conditions and considerations changed since the first SITES survey in 1998?
- What are the trends within and between national education systems?
- What do the differences and similarities between these systems suggest?
- How should change be promoted in education in order to support teachers in their work?
- Is there evidence that key strategic factors commonly found in ICT-related educational policies do influence teachers’ pedagogical use of ICT?

Because these questions are interconnected, the SITES 2006 researchers recognized that if we are to make sense of changes in pedagogical practices as a result of ICT-use, then we need to view those practices in terms of the interacting layers in the 22 education systems surveyed. The evidence presented in this report was therefore drawn from “layers” within each education system, most notably from principals and technology coordinators within the set of schools sampled for each system and from at least two mathematics and two science
teachers teaching Grade 8 classes in each school. The evidence presented here also relates to a comparison across 15 of the 22 systems between the data gathered from the 2006 survey and that gathered from the 1998 survey (Pelgrum & Anderson, 1999).

The SITES researchers took extraordinary care with the thousands of questionnaires in many languages that came out of these surveys to ensure the data they contained could be compared across levels, systems, and time. The information that has emerged from the surveys confirms the complexity of change relative to ICT in education and the need for ecological perspectives on the socio-cultural changes occurring in education worldwide. The diversity of factors that influence a teacher’s adoption of ICT can also be envisioned in layers that frame perspectives of the classroom as nested within the school, the local area, the region, and the global “biosphere” of education. For example, current theoretical models describe multi-staged adoption of ICT in a classroom that stems from each teacher’s current concerns, with these, in turn, inter-connected with the vision of the leader of the department and the school (Davis, 2008).

The chapters of this book have been carefully organized to take readers through three layers of educational ecologies and their interactions, and also to educate readers on the many methodological challenges that beset the SITES researchers and the ways in which they solved them. Technology also played its part in the research process, with the participating systems able to engage in online data collection if they so chose, and with researchers having access to analytical tools including relational analysis with multi-level modeling. Building on the SITES 2003 case studies of innovative practice (Kozma et al., 2003), the researchers involved in SITES 2006 categorized pedagogical practices into traditional and two complementary aspects of 21st-century pedagogy, namely lifelong-learning and connectedness.

The findings presented in this book are fascinating and valuable. If the relevant agents within each system act on the implications arising out of these findings, we should see a considerably more effective use of the very large investments made worldwide in ICT in education. It is relevant to note here that publication of this important book coincides with UNESCO’s release of its ICT-competency standards for teachers (UNESCO, 2008), which in itself is a confirmation that governments, experts, and practitioners increasingly are recognizing the important role that ICT can play in supporting educational improvement and reform.
The book’s recommendations not only combine well but also verify an ecological perspective that could have better informed past initiatives. For example, adoption of SITES 2006 recommendation 5, “Policies that adopt a balanced, holistic approach catering for leadership development, professional development, pedagogical and technical support for ICT-use as well as improved ICT-infrastructure in schools will be more successful than policies focusing on one or two strategic areas,” could have avoided the widely publicized challenges of inadequate leadership development and infrastructure experienced in mandatory ICT-related teacher training in the UK (Davis, Preston & Sahin, 2008). In addition, the positive effect of recommendation 5 would be amplified many times if combined with recommendation 7, which links school development into the broader curriculum framework of the system or nation, and even more so if it were to include the 21st-century student outcomes emphasized in recommendation 1.

If our society is to adjust to and avoid damaging turmoil, alienation, and the threat of disintegration, then the impact and potential of ICT must be at everyone’s fingertips. In short, we all have a role in its development (Dutton, 2004). It may be impossible to change our 19th- and 20th-century education systems to serve new generations equitably, but we must strive to do so. Lifelong learning and connectedness are essential additions to education designed for the 21st century, but they will not take firm root unless they are aligned with development of appropriate ICT-related pedagogies across and within our interlinked educational ecosystems, and herein lies the importance of this report on the SITES 2006 survey. This book provides the world with an extraordinarily valuable comparative study, and I recommend it to leaders of all education systems.

References


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