From ICT coordination to ICT integration: a longitudinal case study

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Abstract

This study utilizes a school-improvement perspective to examine the role of curriculum coordination in the integration of information and communication technologies (ICT) into primary schools. The nature and impact of this role is examined in seven primary schools in Australia. These seven schools were drawn from a longitudinal intervention that provided additional ICT-related resources and personnel to the schools. An instrument, referred to as the Learning Outcomes and Pedagogy Attributes (LOPA) measure, was developed and charted for the seven schools over the 4-year data collection period. The changes in LOPA score over time were then analysed in terms of the conditions at the school with regard to curriculum ICT coordination. The study concludes that the coordinator role and school leadership in general, play critical but varying roles in the complex process of ICT integration into schools. Success appeared to be associated with the support provided for the role, the extent to which the role was connected to school leadership, personal leadership characteristics of those in the role and the strategies employed within the role.

Keywords

case study, ICT coordination, ICT integration, leadership, school improvement.

Introduction

Education has always lived in tension between two functions: education as a matter of assuring continuity and as a matter of fostering change and creativity (Haddad & Draxler 2002). Within these developments, information and communications technology (ICT) brings a new set of challenges and pressures. Research on ICT in education reveals that although teachers are gradually starting to integrate ICT into their teaching strategies, significant differences are observed in the way ICT is integrated in the classroom (e.g. Tondeur et al. 2008b). Some teachers are intrinsically motivated to use ICT in educational practice, while others do not share this affinity. For this reason, many researchers have centred on critical teacher-related characteristics associated with educational ICT use such as their ‘computer experience’ (Bovée et al. 2007), their ‘innovativeness’ (van Braak et al. 2004) and their personal ‘beliefs about education’ (Ertmer 2005).

In order to complete existing research by including school-related characteristics, we examined ICT integration from a school improvement approach (cf. Tondeur et al. 2008a). This leads to a strong focus on the school as a unit of change and pays additional attention to the internal conditions at school level. Hopkins and Reynolds (2001) argue that a school improvement approach to educational change embodies the long-term goal of establishing a self-renewing school. They stress the central role of the school level in mediating change and focus on the internal conditions in schools. ICT integration can be seen as a specific case in the wider field of school improvement. Just like school improvement, ICT integration is a complex process and no...
simplified ‘cookbook approach’ can promise success. Therefore, teachers need considerable support with regard to ICT integration (Lai & Pratt 2004). Based on these studies, it appears that teachers reporting a high degree of school-related ICT support incorporate ICT in their practice more often.

The support required by teachers varies in its type and extent but ultimately requires coordination, management and leadership. Moyle (2006) highlights the critical role of leadership and particularly in providing curriculum leadership and support. More often, this involves a curriculum/pedagogical ICT coordination role that focuses on supporting teachers to facilitate ICT integration. In this respect, Lawson and Comber (1999) stress the need for ongoing support by an ICT coordinator. They argue that ICT coordinators are in the best position to provide information about the ICT infrastructure, software, the development of an ICT school policy and ICT-related support.

The main aim of this paper is to describe the characteristics of support for ICT integration in education and the critical role of the ICT coordinator. More specifically, it examines the role of the ICT coordinator with respect to the key factors for educational change emerging from the school improvement approach, such as the provision of long-term goals and systematic strategies (Hopkins & Reynolds 2001), and professional development (Stoll 1999). The second aim of the paper explores the extent to which the use of ICT in the classroom practice can be associated with the support of the ICT coordinator and the nature of the role. The paper is based on a study using data collected for a large evaluation project in Australia that for purposes of anonymity will be referred to as the Project. The Project was an intervention in schools that provided additional ICT-related resources (hardware, software, networking and personnel). The study for this paper involved case studies for seven primary schools within the Project. The data used was gained by interviewing the school leader, the ICT coordinator, and a sample of teachers. In addition, a survey was conducted among all teachers of the schools, the principal, and the ICT coordinator, and relevant school documents were studied. The data for the seven schools were collected in four waves (between 2005 and 2008). This type of evaluation, based on a quasi-ethnographical model of a longitudinal case study, was chosen because of the need to collect rich data from a specific group of schools (see rationale provided by Newhouse & Clarkson 2008).

Before presenting results, we first describe the literature with respect to school improvement and how it can be related to ICT integration in general and ICT coordination in particular. In the next section, the development approach of the study is described. The paper concludes with a discussion of the results and the implications for future research.

Background
Supporting ICT integration from a school improvement point of view

The literature about school improvement stresses the importance of school-related support in developing a commitment to educational change (Stoll 1999; Hopkins & Reynolds 2001). It is generally acknowledged that educational change benefits from a supportive environment (Fullan 2001). Studies focusing on the relationship between school-related support and ICT integration in the classroom are often limited to a focus on access to computers and software (cf. Bradley & Russell 1997). However, effectively integrating ICT into learning systems is much more complicated than providing computers and securing a connection to the Internet. Computers are merely tools; no technology can fix an underdeveloped educational philosophy or compensate for inadequate practices (Ertmer 2005). Critical choices have to be made in terms of the relationship between ICT use and educational objectives. In this respect, the process of supporting ICT integration is a dynamic one involving many interacting factors over time.

Therefore, researchers argue for a more holistic approach to study the process of ICT integration that considers a range of factors (e.g. Kennewell et al. 2000). In these studies, additional factors are incorporated, such as the development of an explicit ICT school policy plan that stresses a shared vision about the role of ICT in education (Tondeur et al. 2008a). It appears that a strategic ICT plan that sets clear goals and defines the means to realize these goals is a crucial step towards actual ICT integration (Bryderup & Kowalski 2002; Vanderlinde et al. 2008). Analysis of school improvement research also reveals the importance of clear goals and systematic strategies to direct educational change.
(e.g. Stoll 1999). A sufficient level of school autonomy, the development of school policies and a collaborative team seem to be positively related to school improvement.

Other key factors from the school improvement approach that can be connected to support ICT integration in the classroom are: strong leadership to guide change efforts (e.g. Gray 1997), professional development and support for the implementation of reforms and evaluation systems for monitoring change processes (e.g. Stoll 1999) (for an overview see Tondeur et al. 2008a). A clear example is the importance of leadership in managing ICT integration. Several studies (e.g. Dawson & Rakes 2003) support the claim that leadership in promoting change is a key factor when it comes to merging ICT and instruction. School leaders (principals, ICT coordinators) are in a position to create the conditions to develop a shared ICT policy. The leadership dimension is expected to have a specific impact with respect to ICT coordination via its influence on teacher participation in decision-making, feelings of uncertainty by teachers and professional development opportunities (cf. van den Berg et al. 1999). When teachers feel that the school leader stands behind them, is concerned about their feelings and supports them when problems arise, they are more likely to be stimulated to adopt an innovation (Hargreaves 1994).

In addition, as mentioned above, the degree of ICT training (Galanouli et al. 2004), the amount of ICT-related support (Lai & Pratt 2004) and adequate evaluation to monitor the integration of ICT (Kennewell et al. 2000) can be connected to the other dimensions emerging from the school improvement theory. Baylor and Ritchie (2002) argue that ICT training has an important influence on how well ICT is embraced in the classroom. According to Cohen and Hill (2001), the most effective teacher training experiences are school subject specific practices, immediately relevant for classroom instruction and connected to school policy. While systematic ICT training is clearly useful, Cohen and Hill (2001) argue that many teachers seek continuous support, and, therefore, mechanisms need to be put in place to ensure that they have adequate access to such support. In this respect, Lawson and Comber (1999) stress the provision of ongoing support usually facilitated by the ICT coordinator. This brings us to the next section.

Empirical studies on ICT coordination in education

Clearly, the process of ICT integration is a dynamic one involving interacting factors and actors over time. Moreover, no single approach exists to address the challenges related to the varying perspectives on ICT use (Ertmer 2005). Therefore, considerable support and coordination is needed to integrate ICT in teaching and learning processes. It seems that teachers reporting a high degree of ICT-related support incorporate ICT in their practice more often (Galanouli et al. 2004; Lai & Pratt 2004). Furthermore, research findings confirm that most of this support is supplied by school-based ICT coordinators (Tondeur et al. 2008a). Coordinators, in practice, however, often appear to primarily provide schools with technical expertise, while their impact on educational or policy-related issues seems limited (Lai & Pratt 2004). Somekh (1996) noted that the need for technical support tends to take precedence over curriculum support.

According to Lai and Pratt (2004), the main responsibility of the ICT coordinator should be to guide ICT integration in teaching and learning (curriculum support). In the study of Tondeur et al. (2008a), principals indicated a lack of time as an important obstacle for providing curriculum-related support. It would therefore be recommended to distinguish between ‘technical ICT coordinators’ providing schools and teachers with technical support, and ‘curriculum ICT (CICT) coordinators’ focusing primarily on pedagogical support for integrating ICT into the curriculum. Interestingly, many principals in the study of Tondeur et al. (2008a) reported that it would be advisable to appoint a teacher as a CICT coordinator in order to maintain the innovation. At this time, it has to be stated that local school policies, such as effective provision of support by the CICT coordinator, are often underutilized, and it is clear that ICT integration is not yet achieved in a systemic or systematic way in most of the schools (Janssen Reinen 1996). According to this study, very few schools can be labelled as ‘learning organizations’ with a shared commitment to ICT integration.

The main objective of the Project, from which data for this paper were drawn, was to enhance the capacity of schools to lead change associated with effective application of ICT into the curriculum. A critical component in this respect was the appointment at each school of a school-based CICT coordinator. This
position was appointed by the principal and was funded through the Project to allow time release based on school size. Funds were also available to allow access to centrally provided professional development and support for the position. The role of the CICT coordinator was to provide school-based leadership and support to staff as they planned and delivered learning experiences involving ICT; very much in line with that outlined by Lai and Pratt (2004). The Project also provided improved ICT infrastructure (networking, hardware and software) and some coordinated professional learning, and central curriculum and technical support for Principals, CICT coordinators and teachers.

Purpose of the study

The literature suggests that the success of ICT integration depends partly on the support and coordination provided at the school level. In this respect, a first purpose of the present study is to examine the role of the CICT coordinator with respect to the key factors for educational change emerging from the school improvement approach as discussed above: ‘clear goals and systematic strategies to direct educational change’, ‘strong leadership to guide change efforts’, ‘school internal support to ensure ICT integration’ and ‘evaluation to monitor the integration of ICT and guide ICT planning to monitor the integration of ICT’. The second aim of the study explores the extent to which the use of ICT in the classroom practice can be associated with the support of this coordinator role.

Research method

Sample

This paper discusses the impact that the CICT coordinator role had on ICT integration in a subset of the schools involved with the Project. To determine this subset, a selection process was devised to provide the most useful data set from which to draw conclusions. This was based on the following conditions: (1) the school had participated throughout the four data collection periods of the Project evaluation; (2) the school teaching staff consisted of at least six teachers; and (3) the response rate for the teacher survey was at least 50% for each of the four data collection periods. As a result of this filtering process, seven schools remained and these form the sample upon which this study is based. Table 1 describes this sample over the four data collection periods.

The seven schools were public (government) primary schools with staff numbers ranging from 8 to 25 and student numbers from 150 to 388 over the course of the project. All of the schools served low to middle socio-economic communities and, hence, they were considered to have similar characteristics in terms of financial resources, infrastructure and staffing. This is important to take into consideration as it reduces the impact of these variables on the discussion that follows.

<table>
<thead>
<tr>
<th>Data collection period</th>
<th>Dates</th>
<th>Number of teachers surveyed</th>
<th>Gender</th>
<th>Mean years teaching experience</th>
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<td>Baseline</td>
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<td>86</td>
<td>M: 13</td>
<td>68</td>
</tr>
<tr>
<td>1st comparison</td>
<td>2006</td>
<td>87</td>
<td>F: 14</td>
<td>69</td>
</tr>
<tr>
<td>2nd comparison</td>
<td>2007</td>
<td>74</td>
<td>M: 10</td>
<td>58</td>
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<tr>
<td>3rd comparison</td>
<td>2008</td>
<td>84</td>
<td>F: 13</td>
<td>67</td>
</tr>
</tbody>
</table>

Table 1. Data collection summary.

Procedure and instruments

To gain concrete insight into the relationship between ICT coordination and ICT integration, the data were analysed for the seven case studies. The study made use of qualitative and quantitative methods. The data were collected on school site visits where a researcher spent 1 or 2 days at each school. The data of this cohort of seven schools were collected in four waves (2005–2008) as indicated in Table 1.

For each school, the data collection included:

- **Interviews** with principals, CICT coordinators and selected teachers identified by CICT coordinators as good ICT practitioners;
- **Observation** of ICT facilities and infrastructure;
- **Questionnaires** administered to all teachers, the principal, and the curriculum ICT coordinator; and
- **A review of school documents** including school planning/policy documents and teachers planning documents.

The teacher questionnaire consisted of 16 questions with multiple parts, some requiring open response and the others closed response. These questions were
designed to collect data on (1) the frequency of ICT use; (2) the frequency of various teaching strategies (e.g. work on computer laboratory, work in groups); (3) the purposes for ICT use in the classroom (e.g. illustrate a concept, analyse information); the perceived outcomes of classroom ICT use (e.g. better curriculum understanding, engagement); (4) the specific activities the teacher had been carrying out in the classroom (open-ended responses); (5) the teacher’s pedagogical style (e.g. directs student activities, gives students freedom of choice); and (6) the teacher’s ICT skills across commonly used applications.

The teacher interviews were structured around 15 questions concerning the class environment and general pedagogy, and 25 questions concerning the use of ICT by students and the teacher, and perceptions of the coordinator position and impact of the project on teachers and students. Observations and school documents were used to support conclusions drawn from the questionnaires and interviews. These data were summarized in database files that were all connected to a School Analysis relational database file. The data in these databases were then further analysed and added to, using a number of rubrics to guide judgements. For further details on the methodology and instruments refer to Newhouse and Clarkson (2008).

The measure that is of particular interest to this paper was formed from items in the teacher questionnaires related to ICT use to enhance pedagogy. This is referred to as the Learning Outcomes and Pedagogy Attributes (LOPA) measure and was constructed after a review of international research into the impact of ICT on learning outcomes and pedagogy. This uses judgements on 11 attributes of a learning environment as a measure of the quality of learning environments and the use of ICT to improve this quality. These learning environment attributes were investigation of reality, knowledge building, active learning, authentic assessment, engagement, student productivity, higher level thinking, learning independence, collaboration and cooperation, learning styles, and physical disabilities. Data from the surveys of teachers were used to firstly calculate a Teacher LOPA score for each teacher with a notional maximum score of 11. A School LOPA measure was determined for each school by averaging the LOPA scores of the teachers for a school (refer to Newhouse & Clarkson 2008 for further information on the LOPA measure). The judgements from which the LOPA scores were calculated were made independently by two researchers using the databases and rubrics. This resulted in high inter-rater reliabilities for the LOPA measure over the course of the Project (correlation coefficients between 0.8 and 0.9, significant at \( P < 0.01 \)).

The LOPA scores for the seven selected schools were calculated for each of the four data collection periods. Analysis of variance (ANOVA) with post hoc testing (Bonferroni) was carried out to determine statistically significant differences in LOPA score over the course of the project. Finally, the School Analysis database was interrogated with regard to these seven selected schools to locate qualitative data relevant to ICT coordination and school leadership. These results were used to gain a deeper qualitative understanding of the LOPA trends in the schools.

Results

In this section, we first present the results with respect to the changes in ICT integration along the four distinct data collections. Subsequently, we focus on the impact of the CICT coordinator in relation to the key factors emerging from the school improvement approach and how this can be linked to changes in ICT integration in learning and teaching practices.

Observed changes in ICT integration

The first analysis examined whether changes over time can be observed with respect to ICT integration in the seven schools. The School LOPA scores for each of the seven schools were plotted, resulting in the graph shown in Fig 1. This allowed for comparisons over time and for general trends to be identified. Examining the graph, it is important to note that the LOPA scores for 2005 represent a true baseline. That is, these data were collected prior to the formal beginning of the Project. Additionally, the final data collection in 2008 was collected after the conclusion of the Project. Figure 1 therefore represents the trends in the school LOPA scores over the
entire course of the Project intervention that included support of a CICT coordinator role.

Having obtained the chart in Fig 1, we carried out an ANOVA to test changes in the LOPA scores of the seven schools (S1, . . . , S7) over time. The four different data collections were entered as independent variables to compare the LOPA scores. The multivariate test shows a significant effect ($F(3, 24) = 6.39; P = 0.002$) for all schools. The corresponding ANOVAs also reveal significant effects for S1 ($F(3, 37) = 4.66; P = 0.007$), S4 ($F(3, 59) = 6.20; P = 0.001$), S5 ($F(3, 43) = 2.90; P = 0.046$) and S6 ($F(3, 59) = 3.76; P = 0.015$). These results show that the LOPA scale was a sensitive enough measure to highlight statistically significant variations in the schools over time.

Post hoc analyses (Bonferroni criterion) were conducted to verify whether different outcomes are related to different waves in the data collection. Significant differences are summarized in Table 2.

Table 2 shows that almost all of the statistically significant changes in school LOPA scores occurred during the first year (2005–2006) of the Project and to a lesser extent over the first 2 years (2005–2007). Looking again at Fig 1, this is confirmed by the steep gradients of the school graphs over this period, particularly for S1, S4 and S6, which had significant increases in their school LOPA score in the first year. Two other schools, S2 and S7, had relatively large changes in LOPA over this first period as well; however, statistically (probably because of smaller numbers of respondents in these schools), these results were not significant. Although the following discussion will focus on the schools with significant changes (i.e. S1, S4, and S6), the reader may keep in mind that S2 and S7 had similar characteristics over the first year of the Project. Later in this section, we will discuss and attempt to explain the two schools (S5 and S7) that do not follow the general pattern in that their LOPA score continues to rise after the end of the project.

It is also interesting to note that the seven schools began the Project tightly clustered in terms of LOPA scores and ended the Project (excepting S7) in a similar way. There is a marginal increase in all schools’ LOPA scores from 2005 to 2008. We believe this marginal increase represents the residual effect left after the Project’s cessation and is probably due mainly to the improvements in hardware and network infrastructure that remained in the schools.

We will now discuss generally the role of the school leadership and specifically the role of the CICT in each of the three time periods 2005–2006, 2006–2007, and 2007–2008. As we are examining this data from a school improvement perspective the key factors we will...
look at are: (1) school internal support, (2) leadership, and (3) ICT planning.

**Characterizing CICT support 2005–2006**

A majority of the school principals reported that the role of the CICT coordinator and associated professional learning activities was critical in the process of ICT integration in teaching and learning. The principal from one of the schools (S4) that made significant progress over this period made the following comment regarding the CICT coordinator:

> The CICT coordinator creates a vibrant, motivating learning environment whereby pupils use ICT as a tool for learning. He also provides opportunities for teachers to use ICT in a meaningful way to improve pupils’ outcomes.

(Principal S4)

The extent and nature of this support varied among the schools. From the comments of a number of CICT coordinators, it seems that the support within a school was more likely to be successful where it was driven by the specific teaching and learning needs of the teachers. In the schools where there was evidence of a significant increased meaningful use of ICT in 2006 (S1, S4 and S6; see Table 1), the work of the CICT coordinator seemed to be more focussed on one-to-one support, role modeling, scaffolding, peer collaboration and peer support.

The most powerful support has been that which provides a strong ‘hands-on’ focus. Participating in the learning journey with my colleagues and helping them problem solve issues for themselves. Being an advocate for the use of technologies in the teaching and learning process and providing a role model for this integration.

(CICT coordinator S1)

Further important success factors for CICT coordinators were their position in the leadership (status) and decision-making structures within the school as well as a range of personal characteristics. In the schools that made significant progress in the first year of the project, the CICT coordinators were enthusiastic, experienced and respected staff members (S1, S4, S6) that were well supported by the school principal. In the less successful schools (S3 and S5), the CICT coordinators were young teachers and in one case, a new graduate.

The CICT coordinator is a long-time and respected senior staff member. She is a major catalyst in the school.

Those teachers who work with her improved significantly, for others, there was little change.

(Principal S1)

The schools in which the CICT coordination had the most positive impact tended to be those in which whole-school curriculum approaches to the integration of ICT into learning programmes were evident. Nevertheless, in only one of the schools (S1), this whole-school approach appeared to be integrated in an ICT school plan.

ICT integration within the curriculum will be sustained in the school plan. ICT is embedded in the school curriculum. The school aims to enhance professional learning for staff. It has a ‘computers as tools not toys’ philosophy, with a focus on improving/enhancing curriculum access.

(CICT coordinator S1)

**Characterizing CICT support between 2006 and 2007**

From Fig 1, it is clear that in some schools, the integration of ICT declined between 2006 and 2007. The most likely explanation was that during 2007 there was a protracted and serious industrial dispute involving public school teachers that included a ban on involvement with professional learning activities and any additional duties. This situation when combined with the high turnover of often inexperienced teachers probably led to reduced facilitation of ICT use in the schools. Few schools appeared to have a formal set of policies and practices designed to handle staff turnover. To tackle this problem, two schools included ICT use and facilitation within the performance management framework for teachers (S1 and S2). Nevertheless, it seems that any overall skills improvements were too slow to effect critical improvements in the use of ICT in classrooms.

Most teachers need support and professional learning to develop a greater awareness of the range of applications of ICT and higher level skills in operating ICT applications. In particular, they need exposure to a range of applications of ICT to connect with their literacy and numeracy programmes. Most teachers need supported experience in facilitating the use of ICT in the classroom rather than in the laboratory. Very slow progress though!

(CICT coordinator S6)

It appears from the interviews with the CICT coordinators that most teachers in the sample schools either lacked adequate ICT competence, or the understanding of the potential for ICT applications to relate to their
curriculum and the learning outcomes for their students. Similar to the finding for 2005–2006, most principals judged the role of the CICT coordinator to be effective in this respect.

The removal of the lab as a point of skills development and weekly use in preference for use within classrooms meant students had a reduced access and very limited skills development. CICT coordinator is working on this – mentoring teachers and modeling pedagogy. (Principal S5)

Compared with 2006–2007, this support was organized more for one-to-one support between a CICT coordinator and teacher, rather than whole school activities. This is illustrated in school S4.

I meet with every teacher at the beginning of term for a 2 h planning session. This session includes links to the Curriculum Framework (specific to Learning Areas & Learning Outcomes), repertoire of teaching strategies, negotiated brief parameters, reporting criteria, etc. I put levels in the ‘Get Work folder’ to assist teachers in planning and reporting. Teachers are now able to look at how they can incorporate ICT in the design of activities to aid in the achievement of Learning Outcomes rather than just teaching student skills. (CICT coordinator S4)

Next to the finding that the level of ICT use in classroom practice had decreased in some of the schools; there was less evidence of teachers being involved in decision-making through staff meetings, IT committees or other school meetings. School S2, the only school with an increased ICT use, was an exception, since the development of their ICT school planning was clearly described.

The principal is very keen on ICT supporting a shift in pedagogy and is specifically tying this to the performance management of the CICT and teachers. He expects them all to incorporate a specific project using ICT and to review student work at end of year. He has built the CICT role into planning in the school and performance management of teachers. (CICT coordinator S2)

Characterizing CICT support between 2007 and 2008

In the final year of this study (2008), the role of the CICT coordinator largely disappeared in five of the schools and diminished in the other two (S2 and S7), which had a negative impact on the progress of ICT use in all of these schools. The Project provided funding to fulfill the role of CICT coordination for a two-year period (2006–2007). Whether the role continued depended on the school principal and the available funds. The principal in S4 for example decided not to continue the role of CICT coordination.

The CICT no longer has this role in the school because I believe this support is no longer necessary due to other strategies in place. (Principal S4)

In S6, the principal reported that the school had regressed in the use of ICT between 2007 and 2008 because of the lack of CICT coordination. This principal stressed the need for more central support for the CICT position. Some principals also cited the need for technical support. In schools where an ICT-related coordinator position was allocated, this person was mainly involved in trying to maintain the ICT infrastructure.

Last year had three principals and this year lost two of the most ICT skilled teachers, including the CICT coordinator. New CICT coordinator has taken time to upskill and has had to deal with many technical problems. (Principal S2)

In some schools, the reduction in the role of CICT coordination had less of a negative impact but was still mentioned as a concern in interviews. In one of the more successful schools (S6) between 2005 and 2007, where the principal reported to have a very effective CICT coordinator, a new CICT coordinator had struggled to support the process of ICT integration (see Fig 1). According to the principal, she had been provided with little time, was a much less experienced teacher and did not appear to be perceived to be a leader by many of the staff who were far more experienced.

Being a younger teacher in an older school, it is likely that she is not perceived as a leader by many teachers. (Principal S2)

A critical factor in the effective support of ICT integration seems to be the existence of a strategy at the school level that addresses future development and sustainability, and includes some means of monitoring progress. This search for a more strategic approach can be illustrated in the case of school S5.

This has certainly had a marked change in the way we operate and address our curriculum needs. Three years ago, there were minimal influences. Today, we automatically plan, monitor and evaluate and integrate the use of
ICT. It is seen as a tool to complement all the other aspects that drive our curriculum implementation.

(CICT coordinator S5)

Finally, it is interesting to examine the two schools, S5 and S7, which, unlike the other schools, increased their LOPA scores over 2007–2008. Both had significant changes in leadership in the previous year (2006–2007) in that at the schools, the principal, who in both cases was supportive of the project, was absent and a substitute was acting in the position. It is likely that with the principal’s return, there was renewed energy being put back into ICT integration. In school S7, the CICT coordinating role was continued into the 2007–2008 period despite the fact there was no specific funding as the Project had formally ceased and this may go part of the way to explaining the school’s high final LOPA score comparative with the rest of the sample. Additionally, at school S7 during 2006–2007, there was a fire at the school that burned down the computer laboratory and this too may have produced a sense of renewal and enthusiasm at the school with new ICT equipment arriving in 2007–2008.

Discussion

The main aim of this study was to examine the role of the CICT coordinator with respect to ICT integration in teaching and learning processes. First, the results confirmed that the support of ICT integration was dependent on the CICT coordinator role. This is in line with research findings suggesting that ICT coordinators are in the best position to provide ongoing ICT support (Lawson & Comber 1999; Lai & Pratt 2004). From the results, it seems that the role of the CICT coordinator was successful in the first 2 years when adequately supported and driven by specific teaching and learning needs for a school. When this support largely disappeared in the final years, this had a negative impact on the progress of ICT use in most of the sample schools.

In schools where some encouraging progress was made in ICT integration, this was largely due to the CICT coordinator as the driving force with support from the principal. The results of this study suggest the effectiveness of the role of the CICT coordinator depended on its connection with leadership in the school and a range of personal characteristics and the status of the person in this role (cf. Baylor & Ritchie 2002). This corroborates previous studies that have shown that leadership promoting change is a key factor when it comes to merging ICT and instruction (e.g. Dawson & Rakes 2003). In this respect, the coordinator needed to be viewed as a leader in the school by teachers, either on the basis of personal attributes, longevity at the school or position in the school. From our results, it is clear that when the CICT coordinator was a strong leader, well supported by the principal and visible throughout the school community, there were sustained positive outcomes. Typically, these CICT coordinators had a formal part in the leadership and decision-making structures of the school.

Nevertheless, in most of the sample schools, a high staff turnover of often inexperienced teachers made actions towards ICT integration difficult in addition to developing teachers’ ICT skills and understandings. The development of a school-based ICT plan that includes the coordinator role can be presented as a promising approach to handle barriers such as a high staff turnover. In this respect, Stoll (1999) highlights the importance of clear goals and systematic strategies to direct educational change, with team development and professionalism of principals, ICT coordinators and teachers being necessary conditions. Few schools, however, appeared to have any formal set of policies and practices designed. The study of Tilbury (2004) confirms that whole-school approaches that involve staff in learning for change towards sustainability are rare. Clearly, it seems that a strategic ICT school plan needs to be developed that sets clear goals and defines the means to realize these goals (cf. Bryderup & Kowalski 2002; Tondeur et al. 2009).

As could be derived from the interviews with the principals, it appears that in many of the schools, the development of whole-school approaches for sustainable ICT integration, they believed, was beyond their resources. In their study, Özdemir and Kılıç (2007) stress the need for a systemic and comprehensive support for ICT coordinators, principals and classroom teachers in the theory, pedagogy and technological aspects of ICT integration. They revealed that the inadequate knowledge and skills of the ICT coordinators was one of the factors against the successful integration of ICT. This is in contrast to the results of this study, where the principals indicated that the role of the CICT coordinator was critical in the process of ICT integration in teaching and learning, irrespective of their personal ICT knowledge and skills. One of the reasons for
this could be the professional learning they received through the Project concerning how to support their teachers, particularly in strategies to make use of classroom-based computers. Throughout the subsequent waves in this study, the CICT coordinators all indicated the importance of the support they received from the central project team and the professional learning opportunities provided, particularly when this involved meeting with other coordinators. Unfortunately, the role of CICT coordination had largely disappeared in all but two of the sample schools, and even in these schools, this role had diminished.

Conclusions

This longitudinal case study provides a close-up view of CICT coordination in primary education. It can be concluded that the support of an effective CICT coordinator in a school was an important factor in motivating staff and encouraging a whole school facilitation of ICT use to support learning. More specifically, it seems that the CICT coordinator was more likely to be successful where the support was driven by the specific teaching needs of the teachers. Examples of strategies resulting in an increased use of ICT were one-to-one support, role modeling, scaffolding, peer collaboration and peer support. The findings also suggest that successful ICT coordination is clearly related to dimensions emerging from a school improvement perspective, such as its connection with leadership. In this respect, the study underpins the importance of including CICT coordinators as a formal part in the leadership and decision-making structures of the school. Also critical were the CICT coordinator’s interpersonal and organizational skills, their understanding of the curriculum, and their own competence in using ICT for learning and instruction. It was important that their role revolved around curriculum and was clearly distinguished from that of technical support. A critical dimension that was missing in most of the sample schools was the existence of a strategy at the school level that addressed future development and sustainability, and included some means of monitoring progress.

The knowledge base presented in this study is by no means definitive or exhaustive. Understanding one element leads to the necessity to understand the foundation on which that element rests, which in turn leads to the discovery of other significant elements. Although, in the broadest sense, the process for ICT integration in education appears to be straightforward, underlying it is a complex set of interrelated factors. An important conclusion arising from this study is that the school-based support from a CICT coordinator has the potential to become a vehicle to promote this complex process of ICT integration.

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