



# How leadership for an ICT reform is distributed within a school

Leadership for  
an ICT reform

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529

Received 30 May 2011

Revised 15 July 2011

Accepted 27 July 2011

## Abstract

**Purpose** – The purpose of this paper is to examine the process of information communication technology (ICT) reform in a government school in Singapore. The focus is on the distributed leadership actions performed by various individuals, and how the multiple leaders and their leadership practices interacted with one another.

**Design/methodology/approach** – A naturalistic inquiry approach was adopted, involving the case study of a school in the process of implementing an instructional reform involving the use of ICT.

**Findings** – It was found that distributed leadership for ICT implementation requires a combination of transformational leadership and instructional leadership to develop teachers' capacity to enhance their instruction with ICT, emotional leadership to support teachers' effort to change, and strategic management of resources to sustain teachers' change efforts. Transformational leadership is performed mainly by senior management (SM). Instructional leadership is performed mainly by middle management (MM). Both senior and middle management provided emotional leadership and strategic resource management. In addition, SM provided second-order changes leadership, while MM provided first-order changes leadership.

**Originality/value** – The paper rectifies the current disproportionate focus on the role of the Principal by uncovering the leadership actions performed by other school members, and how these leadership actions are interrelated. In particular, the paper provides insight into how leadership was distributed in a school reform involving the use of ICT for instruction.

**Keywords** Singapore, Schools, Leadership, Managers, Transformational leadership, Resource management, Information communication technology, Instructional leadership, Technology

**Paper type** Research paper

## Introduction

Compared to the broader field of leadership in schools, there are relatively few studies on the role of leaders in information communication technology (ICT) implementation in schools and these studies generally do not build on what is already known in the general literature on leadership in schools (Anderson and Dexter, 2005; Feldner, 2003).

Although few studies which focus on leadership for technology reform in schools have been conducted, leadership is highlighted in the literature on technology use in schools as being key, not just for ICT implementation, but for successful ICT implementation. Success is usually defined as integration into the curriculum and the use of ICT to help students construct knowledge (Flanagan and Jacobsen, 2003; Hew and Brush, 2007; Inan and Lowther, 2010). Fishman *et al.* (2002) proposed that leadership is an “integral part of the successful use of technology in [...] school reform” (p. 7). Anderson and Dexter (2000), based on their findings from a national survey in the USA in 1998, found that indicators of leadership were more critical than infrastructure indicators in predicting successful ICT implementation, defined by the



International Journal of Educational  
Management

Vol. 26 No. 6, 2012

pp. 529-549

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0951-354X

DOI 10.1108/09513541211251370

authors as use of the internet, integration of technology into the curriculum, and the extent to which students use ICT tools to support their learning.

In a comprehensive four-year (1997-2000) case study of a school which successfully implemented technologies for learning, conditions which contributed to this success included strong and enthusiastic leadership, clear goals, a culture of staff collegiality, the sharing of leadership, and the provision of professional development (Prain and Hand, 2003). All these conditions can arguably be subsumed under leadership since leadership support is required to translate goals into practice, sustain a collegial culture, and provide resources for professional development.

### Literature on distributed leadership

#### *Distributed leadership defined*

As with leadership, there is no one, agreed upon definition of distributed leadership (Bennett *et al.*, 2003a). Broadly defined, distributed leadership shifts the focus from leadership performed by individuals in specific roles (in particular the principal in a school setting) towards viewing leadership from an organisational or task-oriented perspective (Smylie *et al.*, 2002).

A good overview of distributed leadership is provided by Smylie *et al.* (2002) who noted there were three main models of distributed leadership in the literature:

- (1) leadership as the performance of key “functions” rather than as the work of specific people in formal leadership roles, as advocated by Heller and Firestone (1995);
- (2) leadership as an organisation-wide resource of power and influence, as advocated by Ogawa and Bossert (1995); and
- (3) a third model as described by Spillane *et al.* (2001, 2004) who argue that leadership practice is constituted in the interactions of school leaders, followers, and situations.

The first model of distributed leadership by Heller and Firestone (1995) views leadership from the perspective of functions performed. Heller and Firestone (1995) observe that the same leadership functions, such as providing and selling a vision of the change and obtaining resources, are often performed by people in different roles. They observed there was “redundancy” (p. 65) in the way the functions were fulfilled: “sometimes in a jointly coordinated manner and sometimes with relatively little communication” (p. 66). This redundancy is viewed positively in that “the more of each [leadership function] that is done, the better, and doing one helps accomplish others” (p. 83).

In the second model which views leadership as an organisational attribute, Ogawa and Bossert (1995) argue that leadership occurs not through the actions of individuals but through interactions among individuals. Indeed, Ogawa and Bossert (1995) view social interactions between organisational members as the “building block” of leadership (p. 236); thus, the unit of analysis is not individual roles but the network of interactions amongst different roles which have access to different information and resources (Ogawa and Bossert, 1995). In such a concept, both the leader and followers are important components of leadership practice.

The third model is also the model applied in this study because it incorporates the essence of the other two models. Similar to Ogawa’s argument that the medium of leadership is in social interaction as opposed to individual actions, Spillane and

colleagues argue that leadership is “stretched over” the practice of two or more leaders in their interactions with followers (Spillane *et al.*, 2004); it occurs “in between” people, between leaders, and between leaders and their followers (Spillane *et al.*, 2006, p. 16). Parallel to Heller and Firestone’s (1995) concept of “complementary redundancy” (p. 65), Spillane (2006) argues that the influence of distributed leadership is more than the sum of the individual leaders’ actions because of their interactions in carrying out a particular leadership activity: one plus one leader is more than just adding the individual effort of two leaders.

Thus, Spillane *et al.* (2001) argue that leadership is distributed in the “interactive web of actors [leaders and followers], artifacts [tools] and the situations” (p. 23). People with access to different knowledge and expertise work interdependently and reciprocally in performing leadership. Based on such a concept of leadership, the unit of analysis is not individual leaders but leadership activity, which is distributed over multiple leaders, followers, and the situation (Spillane, 2005). The next section looks at a typical school in Singapore where leadership roles are indeed distributed according to roles.

#### *Multiple sources of leadership*

Traditionally, whether in the literature on leadership in general or in the literature on leadership for schools, the focus was on one main source of leadership within an organisation, what is referred to as the hero paradigm (Gronn, 2008; Storey, 2004; Yukl, 2001). This hero paradigm is viewed as no longer viable for either commercial organisations or schools, giving rise to a continual search for other sources of leadership.

*The principal:* the principal is the leader most often mentioned in the literature on leadership for schools. With regard to the literature on technology implementation in schools, when leadership is mentioned, it is either stated or implied that this leadership is provided by the principal (Creighton, 2003; Flanagan and Jacobsen, 2003; Kincaid and Feldner, 2002; Schiller, 2003). While the concept of the lone, heroic principal is no longer viable giving the complexity of schooling today, it is still important to study the role of the principal in any research concerning leadership in a school context since arguably the principal is still the school’s chief executive officer. Furthermore, the key leadership functions identified in the literature, such as instructional and transformational leadership, were originally derived with respect to the role of the principal.

*The vice-principal (VP):* compared to the vast literature on the role of the principal, there is scarce literature on the role of the VP (also referred to in the literature as assistant or deputy principal) perhaps because it is viewed as a transitional role to principalship (Venditti, 2002). As the VP in my study lamented during a casual conversation about professional development for VP, the VP is often neglected as he or she is caught in a no person’s land between the principal and the heads of department (HOD), who are referred to in the literature as middle management (MM) or as teacher leaders.

The bulk of the studies on VP involved surveys concerning perceptions of the roles of the VP (Gaston, 2005; Ledbetter, 2004) or their satisfaction with this position (Armstrong, 2004), rather than studies of their enactment of leadership. Nevertheless, the limited literature on the VP’s espoused leadership activities shows some overlap with those performed by the principal – supervising and evaluating teachers, responding to teachers’ needs, providing instructional leadership, professional

development, and visionary leadership – suggesting the likelihood of the VP sharing leadership with the principal, as well as indicating a gap in the literature which needs to be addressed.

*Teacher leaders*: similar to findings on the positive impact of principal leadership, teacher leadership has been shown to be important in achieving both school and classroom improvement (Muijs and Harris, 2003), yet little is known about how teacher leadership is actually enacted and its impact (Kozma and Anderson, 2002; Murphy, 2005; York-Barr and Duke, 2004). This is particularly true in the case of the literature on leadership for ICT implementation in schools, where the concept of teacher leadership is not prevalent.

Although the literature on teacher leadership includes both formal and informal teacher leaders, York-Barr and Duke (2004) noted that dominant forms of teacher leadership reflect formal leadership roles both in the literature and in practice. Smylie *et al.* (2002) suggested that officially appointed teacher leaders might be more effective in facilitating interactions which focus on improving instruction.

*Teacher leadership*: heads of subject departments. HOD are mentioned both in the literature on MM (mainly UK based) and on teacher leadership (Harris, 2005; York-Barr and Duke, 2004). From the literature, the leadership role of middle managers has been identified as important in contributing to and explaining differences in school effectiveness (Brown *et al.*, 2000). Indeed, Siskin's (1991) study indicated a high correlation between effective schools and the strengths of their departments.

In identifying possible sources of distributed leadership in a school setting, the literature did not provide much operational guideline on how to untangle this "interactive web" of actors, artefacts, and the situation. For such guidelines, there was a need to read beyond the literature on distributed leadership, so as to understand leadership functions particularly in ICT reform. The next section examines the functions of leadership.

Leithwood and Duke (1999), in their study of all papers on leadership for schools published in four major administration journals from 1985 to 1995, identified six distinct leadership functions:

- (1) instructional (influencing teachers in ways that will impact students' learning);
- (2) transformational (increasing the commitment and capacity of staff);
- (3) moral (appealing to others by appealing to notions of right and wrong);
- (4) participative (involving other members of the school community beyond the principal);
- (5) managerial (operating the school efficiently); and
- (6) contingent (adapting behaviour to fit the situation).

Of the six leadership functions identified, instructional and transformational leadership were the most predominant functions, in terms of mention in the literature. In addition, the scarce literature on leadership for ICT reforms highlighted leadership practices which alluded to instructional and transformational leadership, although the labels were rarely used.

For instance, a consistent theme in research concerned with effective ICT use is the use of ICT to support and improve instruction (Chang *et al.*, 2010; Creighton, 2003; Kevin, 2009), which is also the ultimate aim of instructional leadership (Blase and Blase, 2004); Grubb and Flessa, 2006; Pansiri, 2008). Many of the strategies highlighted

for effective technology implementation are similar to the strategies proposed for instructional leadership: envisioning opportunities for teaching and learning (Sheppard, 2000), providing professional development opportunities (Ertmer *et al.*, 2002), promoting a sense of collegiality (Prain and Hand, 2003), modeling (Baylor and Ritchie, 2002), coaching (Ertmer *et al.*, 2002), encouraging examination of one's beliefs about teaching and learning, and experimentation with new instructional approaches (Hughes and Zachariah, 2001). Indeed, C.K. Bennett (1996) described the principal who can effectively integrate technology into the school curriculum as an instructional leader with the additional task of managing the technology. Similarly, Shuldsman (2004) contend that it is difficult to be a technology leader without being an instructional leader. Unfortunately, the previous study is mainly prescriptive in nature while the latter is based purely on the perceptions of superintendents; therefore, both do not explicate what instructional leadership in ICT implementation entails in practice.

Besides instructional leadership, transformational leadership appeared to be the other natural leadership function contender in the context of ICT reforms. Amongst the six key leadership models, transformational leadership is the one most explicitly linked to the implementation of change (Leithwood and Jantzi, 2005, 2006). Similarly, a critical characteristic of leadership for ICT implementation in schools is the ability to develop and articulate a vision of how technology could produce change (Kearsley and Lynch, 1992). Yuen *et al.* (2003) observed the need to fundamentally rethink the nature of education using ICT and the possible redesign of school processes. They noted that such change requires shifting transactional management to more transformational practices and leadership. Unfortunately, they did not elaborate on these transformational practices.

To date, there has been limited research on the relationship between transformational leadership and ICT implementation in schools. Ng (2004) conducted two studies, one involving pre-service and one involving in-service teachers, on their perceptions of the influence of transformational leadership practices on the integration of ICT in teaching. In both studies, teachers agreed that all of the eight dimensions of transformational leadership practices highlighted positively influenced the integration of ICT in teaching. However, both studies involved only a survey, which was limited to teachers' perceptions and shed no light on the enactment of such leadership. In addition, the later study considered the influence of transformational leadership practices of only the principal while the earlier study did not attempt to differentiate between the transformational leadership provided by senior management (SM) and that provided by MM.

In summary, the literature on leadership is still dominated by discussions on the role of "the" school leader – the principal. Heck and Hallinger (1999) observed a "blind spot" in the research literature in that scholars have largely ignored other sources of leadership besides the principal (p. 141). Leithwood *et al.* (2000) commented that it was probably safe to assume that the effects of other sources of school leadership (beyond the principal) were "greatly understudied" (p. 51). Similarly, Spillane (2005) noted that both researchers and practitioners tend to equate leadership with principal leadership, thus neglecting how leadership is distributed and actualised amongst other school leaders.

There is still considerable scope for research that focuses primarily and centrally on distributed leadership in action, and on how such leadership is created and sustained (Harris, 2005). This study aims to rectify the current disproportionate focus on the role of the principal by uncovering the leadership actions performed by other

school members, and how these leadership actions are interrelated. It also aims to study leadership practices in action so as to surface theories-in-use (Spillane *et al.*, 2001), which would hopefully address criticisms that research on leadership has little practical utility (Fullan, 2002; Hallinger, 2005).

### Research Aim

Since the literature indicates that leadership is critical in influencing the way teachers use ICT, it is important to study the enactment of leadership, particularly how leadership is distributed amongst individuals. The objective of the study was to provide insight into how leadership was distributed in a school reform involving the use of ICT for instruction. The key questions included the following:

- What were the leadership actions enacted?
- Who enacted these leadership actions?
- What pattern, if any, was there in the distribution of leadership?

### Methodology

As distributed leadership is intimately dependent upon the context, upon the organisation as lived and emerging from specific situations (Bennett *et al.*, 2003a; Spillane *et al.*, 2008), this study adopted a naturalistic inquiry approach (Lincoln and Guba, 1985) involving the case study of a school in the process of implementing a reform involving the use of ICT for instruction. According to Lincoln and Guba (1985), key characteristics of naturalistic inquiry include a natural setting, idiographic interpretations based on the specifics of a case, and an emergent research design to cater to unpredictable situations which emerge from human interactions. These characteristics are in line with the fluid, emergent, and context-dependent concept of distributed leadership.

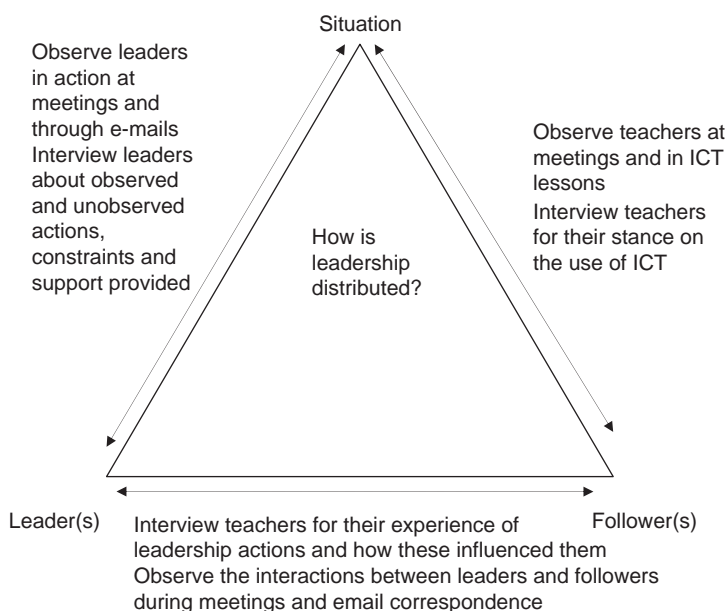
The case study involved observations of relevant meetings, workshops, and analysis of e-mail correspondence to surface emerging leadership practices in action. Identified leaders were interviewed to give their explanations and interpretations of the leadership actions observed. As followers are an integral part of leadership practice (Gronn, 2008; Heck and Hallinger, 1999; Southworth, 2002), the case study involved interviewing followers for their perceptions of leadership provided, and its impact. Gunter (2001) notes that in a study of leadership, such an approach enables the “interplay between what is said is done and what is experienced as being done” (p. 59). The approach taken in this case study is similar to what M. Brown *et al.* (2000) refers to as “a contextualised perspective in action” (p. 243) which includes observing the leader in action, reflecting with the leader what is going on and why, eliciting the views of significant others, and synthesising the different evidence to form a vignette of the leader concerned in a specific context.

Figure 1 (adapted from Spillane *et al.*, 2004) functions as an advanced organiser to illustrate how the two main methods of observation and interview are related to the theoretical perspective of distributed leadership and the three research questions.

### *Distribution of leadership*

For this study, my main interest is in the distribution of leadership, which presumes that the enactment of leadership actions is distributed amongst multiple individuals, who will henceforth be referred to as leaders. The identification of leaders was an





**Figure 1.**  
Alignment of theoretical perspective, research questions, and methodology

iterative, continuous process. At the start of the study, traditional official leaders such as the principal, VP, and HODs, were considered and were observed, together with all the other individuals involved in the ICT reform, for leadership actions. Through this process, it was discovered that some individuals, while officially holding leadership positions, did not perform many leadership actions. On the other hand, some individuals not initially considered as leaders were observed to be performing leadership actions.

The observations of leadership actions were triangulated, or corroborated with interviews of followers for their perception of these actions, since leadership is not leadership unless perceived to be so by followers, a concept which is aligned to the distributed leadership perspective that followers are an integral part of leadership practice (Gronn, 2008; Heck and Hallinger, 1999; Southworth, 2002; Spillane *et al.*, 2004). The process of identifying leadership actions will be explained in more detail in the analysis section of this chapter.

Since distributed leadership is strongly dependent upon the context, upon the organisation as lived (Bennett *et al.*, 2003a; Spillane *et al.*, 2008), this study adopted a naturalistic inquiry approach, involving the case study of a school in the process of implementing an instructional reform involving the use of ICT.

The case study involved field observations of relevant meetings, workshops, and ICT-based lessons, analysis of e-mail correspondence, and 34 semi-structured interviews of leaders and teachers who were involved in the ICT reform. The research encompassed the preparation and implementation time frame of the ICT reform over one academic year in 2007.

The data that were collected included observations of leadership actions during ICT-related meetings and workshops and in e-mail correspondence, discussions with leaders about their leadership actions, as well as discussions with followers on who they perceived as providing leadership, the kind of leadership provided, and its impact.

Gunter (2001) notes that such an approach enables the “interplay between what is said is done and what is experienced as being done” (p. 59). Table I summarises the main methods used for data collection.

An inductive approach (Patton, 2002) to coding leadership actions was adopted. In coding leadership actions, a deliberate effort was made to use gerunds (verbs ending with “ing”) as advised by Charmaz (2006) to minimise the temptation to impose existing leadership functions (usually translated as noun phrases such as “intellectual stimulation” and “individualised consideration”) onto the data. Examples of themes generated this way included “aligning with the department or school” (code 1), “planning ahead for sustainability and scalability” (code 13), and “creating time” (code 5). It was only after all the data had been coded that the themes generated were compared with the literature to determine how the leadership actions identified were related to existing leadership functions such as instructional and transformational leadership. This comparison of themes generated with the literature enabled the researchers to identify some pattern in the way leadership was distributed.

#### *Selection of case*

The main purpose of this research study was to examine how leadership was distributed in the context of an ICT reform in a school setting. Thus, it was important to select a school which was about to embark on an ICT reform, so that leadership for this reform could be examined during the implementation process. In selecting the school and its accompanying ICT reform, the strategy used to choose the school was based on the concept of purposive sampling, with the aim “to maximize information, not facilitate generalisation” (Lincoln and Guba, 1985, p. 202).

The school chosen for this study, Greenville Elementary, was selected from proposals submitted to the Ministry by 66 schools which were awarded the Lead ICT@Schools scheme end of 2006. This scheme recognises and supports schools that are ready to achieve a higher level of ICT use, which is broadly interpreted as the use of technology to bring about active learning.

The criteria for purposive sampling is as follows:

*Intended constructivist use of ICT:* in Greenville Elementary, the school’s stated intention in its proposal was to use ICT as a mindtool (Jonassen, 1999), which is recognised as a constructivist approach to using technology. Therefore, this fit into the study which aims to look at the reform process as school leaders took on the task of changing teachers’ mindset of using technology.

Method	Data
Observations	45 timetabled meetings (approximately one hour per meeting) Four meetings involving middle and senior management Six workshops
Interviews	14 lessons conducted by four teachers All primary 4 teachers (including HOD/mathematics, level manager, subject head e-learning, and senior teacher who were teaching the primary 4 students) HOD/IT, HOD/English
Artefacts	Principal and vice-principal Over 150 e-mail correspondence Lesson plans and or digital resources for 14 mathematics topics

**Table I.**  
Methods of data collection



*Involvement of multiple leaders:* another important criterion for case selection was an indication that at least two official leaders would be involved in the implementation of the ICT reform. At the selection of case stage, the assumption was that the principal, HOD/IT, and the HOD/IP would be potential leaders. This assumption was based on the typical organisational structure of schools in Singapore. In Greenville Elementary, the person indicated as being in charge of the Lead ICT reform was a senior teacher (ST), and the team members included the principal, the two VP, the HOD/mathematics and the HOD/IT.

#### *Brief profile of school*

Greenville Elementary is located in a relatively poor neighbourhood, with one to two-room rented public housing flats, from which 3.2 per cent of its 1,950 students (2008 cohort) originate. At the SM level, the school had a principal (Ms Wong) and a VP (Liz). The principal is appointed by the Ministry of Education from the educational system (primary and secondary schools). A principal typically leads and manages a school for one appointment cycle (six to eight years) whereupon he/she will be assigned to another school.

MM in the school included the HODs (Ben Ling as HOD/mathematics) and level heads (LH) who were the second-in-command for a specific subject (Sarah as LH/science). Similar to SM, the HOD are also appointed by the Ministry of Education and assigned to schools based on the needs of schools. Besides the various heads, Greenville Elementary also had a number of ST, one of whom was the person officially in charge of the Lead ICT reform (Cassie). The post of ST was created as a parallel teaching track to the Ministry's traditional leadership track. The leadership track is "the track for leadership positions in the schools" while the teaching track provides "advancement opportunities for teachers who make teaching excellence in the classroom the Primary focus in their careers" (Ministry of Education, 2006). Table II provides brief profiles of the staff who were observed to have provided leadership for the Lead ICT reform.

#### **Findings**

The objective of the study was to provide insight into how leadership was distributed in a school reform involving the use of ICT for instruction.

Name	Official roles	Relevant details
Ms Wong	Principal	40 years experience No experience using ICT as a teacher
Liz	Vice-principal from 2005 to 2007	18 years experience Previously the head of mathematics; explored with her department the use of ICT
Ben Ling (Mrs)	HOD/mathematics Took over from Liz in 2005	15 years Familiar mainly with PowerPoint
Sarah	Level head for science Level manager for Primary 4	15 years
Cassie	Senior teacher	28 years Appointed as in charge of Lead ICT reform

**Table II.**  
Profiles of leaders

*What were the leadership actions enacted?*

Based on the leadership actions performed by SM and MM in Greenville Elementary, it would appear that SM was mainly providing leadership for what is referred to as second-order changes, while MM appeared to be providing leadership for what is known as first-order changes (Honig, 2003; Leithwood *et al.*, 2000).

First-order changes refer to changes in the core technology of teaching and learning, including the introduction of constructivist models of learning. Research has indicated that an exclusive focus on first-order changes has led to the failures of many change initiatives. Second-order changes are required to sustain and institutionalise first-order changes, and they generally involve changes to organisational structure and cultures, including the effort to distribute leadership (Leithwood *et al.*, 2000).

In this study, an example of leadership provided to influence first-order changes in teaching was the modeling by Cassie (ST) and Sarah (LH/science) of both the process and the products involved in integrating ICT into teaching and learning, in their effort to address a second-order barrier – teachers' resistance to using ICT to support a more constructivist mode of learning. However, it was possible for them to provide this leadership because of a second-order changes initiated by SM: the introduction of scheduled meetings within curriculum hours, thus circumventing a commonly mentioned first-order barrier to technology use – lack of time. Thus, the study indicates a link between first-order and second-order changes mentioned in the leadership literature and the concept of first and second-order barriers in the literature on technology implementation in schools (Ertmer, 2005).

Leithwood *et al.* (2000) suggests that this division of leadership between SM and MM to, respectively, facilitate second-order and first-order changes corresponds to a division of leadership between transformational and instructional leadership. While instructional leadership focuses on improving the core of teaching and learning, transformational leadership focuses on changing organisational structures and cultures. However, as established in the literature, instructional leadership can also be transformational in nature while transformational leadership can involve challenging teachers to rethink their instructional practices as well as nurturing instructional leaders (Marks and Printy, 2003; Pounder, 2006). Certainly, in Greenville Elementary, the instructional leadership provided mainly by Cassie and Sarah was meant to increase teachers' commitment and capacity to transform their teaching through adopting ICT and a constructivist perspective of learning. On the other hand, the transformation leadership provided by the principal and VP empowered and enabled MM to provide such instructional leadership.

*Who enacted these leadership actions?*

In contrast to the literature on technology implementation in schools where the leader mentioned is predominantly the principal (Flanagan and Jacobsen, 2003; Kincaid and Feldner, 2002), leadership for ICT implementation in Greenville Elementary was distributed among different sources of leadership that include: SM (principal and VP) and MM (HOD) as well as teachers who were invested with official leadership roles such as LH or overall in-charge of the Lead ICT reform.

In this study, the school has an existing basic organisational structure of departments. The principal and VP acted as a bridge between the HOD, who were higher in the management hierarchy, and other middle managers such as Sarah (LH/science) and Cassie (ST), as well as teachers, who were lower in the official hierarchy, ensuring that the priority of using ICT use was supported by the department

heads who occupy a “pivotal” position in relation to change efforts in schools (Bennett *et al.*, 2003b, p. 3). An example was the VP communicating to the subject HODs the need to moderate what they normally expect their teachers to do because of the extra time and effort which the Primary 4 teachers needed to put in to the Lead ICT reform:

And I told the HODs we have to let go. If we keep saying that without all these IT lessons, you are expecting ten worksheets, let’s say. With these IT lessons, you still expect ten worksheets, I tell you ah, if I am the teacher, I put myself in the teacher’s shoes, I will definitely [take a] short cut (VP, first interview).

*What pattern, if any, was there in the distribution of leadership?*

The three broad categories (setting directions, developing people, redesigning the organisation) which Leithwood and Jantzi (2005) used to classify transformational leadership can be used to describe the distributed leadership provided by both SM and MM in Greenville Elementary, illustrating how the leadership provided by SM and MM is different yet complementary and mutually supportive.

*Setting directions:* in setting directions, the leadership provided by SM was at the strategic, school level, while that provided by MM was at the subject curriculum and project level, though in support of the school’s overall aim to “get students engaged” (Cassie, 15 September meeting). While the principal and VP aligned the use of ICT to the school’s strategic thrust of engaging students, MM focused on aligning the use of ICT to a specific subject curriculum and to the more specific instructional vision of ICT as a mindtool for visualisation and creation of new knowledge. This division of labour supports the finding of Staples *et al.* (2005) that besides the principal setting the general direction for ICT use, the integration of technology requires a leader who can align the use of ICT to the specific needs of the curriculum. Zhao *et al.* (2004) referred to this person as a “translator” who can help the teachers understand and use technologies in their classrooms. In Greenville Elementary, the main translator for the mathematics subject was Cassie, ST, while the main translator for the science subject was Sarah, LH/science.

Besides making explicit their vision for ICT use, SM also “voiced priorities” (Bennett *et al.*, 2003a) in various ways, such as indicating that completing the mathematics syllabus for examination was not as important as investing the time to engage students in learning with ICT:

I think we’ll definitely test less [math topics] in SA 2 [Semestral Assessment] so we don’t have to rush through the topics. Because I feel that something [learning with ICT] is valuable, is good, if we rush through, we really lose a lot ah (VP, 2 May meeting).

Thus, just as MM’s provision of leadership at the curriculum level supported the school’s strategic direction with regard to student learning, SM’s provision of leadership at the school-level supported MM’s effort to encourage teachers to use ICT to achieve engaged learning.

*Developing people:* instead of the principal personally providing instructional modeling and coaching, as implied by earlier studies on instructional leadership (Blase and Blase, 2000; Southworth, 2002) and on leadership for technology reform in schools (Gibson, 2002; Hughes and Zachariah, 2001), the principal in Greenville Elementary empowered others to do so by appointing Cassie, ST, as the official leader of the Lead ICT reform and by providing the scheduled meeting time for Cassie (ST) and Sarah (LH/science) to exercise instructional leadership with the teachers.

Nevertheless, the principal and the VP were still involved in developing teachers; the focus, instead of being on improving specific instructional practices, was on developing a positive mindset towards change and innovations, on improving oneself and the school by learning from others' good practices. Although an "IT illiterate" (principal, first interview), the principal role modeled to her teachers her willingness to learn how to use ICT more effectively, through her self-funded visit to a school in Hyderabad, India, where the use of ICT was known to be advanced.

Cassie and Sarah, on the other hand, focused on equipping teachers with specific skills and knowledge on technology (such as how to use an excel spreadsheet and dataloggers), pedagogy (ICT as mindtool, value of using digital mindmaps), subject content and learning theories, through a mixture of conventional workshops, on-the-job, just-in-time "training" during the scheduled meetings, providing feedback to teachers' lesson plans, and conducting demonstration lessons:

We really learn from the Senior Teacher [Cassie], and this demonstration speaks a thousand words. It replaced all the sharing [...]. So good, so beneficial to all of us [...]. Then we can just go back and repeat the same thing (HOD/mathematics, second interview, on Cassie's lesson demonstration).

This complementary division of labour between SM and MM supports the literature that successful ICT implementation in lessons usually occurs in schools which encourage instructional innovations in general (Ertmer, 2005; Yuen *et al.*, 2003).

In assigning Cassie to be in charge of the Lead ICT reform, and leaving her "alone" (Cassie, first interview) to decide how to proceed, SM were also developing her as a leader. Thus, the Lead ICT reform served as a "platform" for Cassie to "polish" her facilitating and people management skills (principal, second interview). Besides Cassie, the decision to deploy Ben Ling (HOD/mathematics) and Sarah (potential HOD/science) to the Lead ICT reform was part of SM's strategy to "groom" these future leaders (principal, second interview). While SM provided opportunities for MM to grow in their capacity as instructional leaders, and for all their teachers to grow as professionals, the focus of MM was to develop the teachers specifically in their capacity to harness ICT.

Hence, in developing people, the leadership provided by SM is more transformational and strategic in the sense of developing the organisation's commitment and capacity to innovate and expanding the organisation's leadership capacity, while the leadership provided by MM is more instructional in that their focus is on developing teachers to use ICT to directly impact the instruction delivered to students. The two leadership roles are mutually interdependent in that the leadership by SM nurtures teachers as learners and leaders who can continuously innovate, which supports teachers in their effort to use innovative strategies, including ICT, to nurture their students as effective learners.

*Redesigning the organisation and culture:* in the original category developed by Leithwood *et al.* (2000) for transformational leadership, the focus was on modifying organisational structure and on strengthening school culture. This study's contribution lies in differentiating between the roles played by SM and MM in this category. While SM had the official authority to redesign time, physical space, and organisational structure, MM's authority was limited to redesigning their subject curriculum and assessment. Nonetheless, to redesign curriculum and assessment for their subject area, MM still required the support of SM.

SM's redesign of the timetable structure was necessary in order for MM to have the time to provide instructional leadership to develop the teachers' capacity to use ICT.

The lack of time to perform leadership is a problem mentioned by many teacher leaders (Muijs and Harris, 2007; Turner, 2003). In this sense, SM's leadership in redesigning structure had an impact on MM's execution of instructional leadership in developing people:

Freed up, for a group of teachers, so that they can meet as a level to discuss issues, share problems that they face, those who need help, shout out, and they can put into their agenda for the following week or see how they can help each other. So it's time for collaboration, time for discussion of how things can be done better. That's timetabled time (principal, first interview).

Another organisational structure which enabled instructional leadership by MM was assigning Sarah, the LH for science, the additional post of level manager, which provided Sarah with access to all the Primary 4 level teachers as manpower resource for the development of ICT lessons, regardless of the subject department which the Primary 4 teachers belonged to.

*Emotional leadership.* Another leadership function which was performed by both SM and MM in Greenville Elementary was the provision of what we have decided to label emotional leadership, for lack of a corresponding term in the leadership literature, the closest concept being emotional intelligence (Barbuto and Burbach, 2006; Goleman, 2006). Emotional leadership consists of different leadership functions found in the literature, including individualised consideration (transformational leadership), providing encouragement and recognition (in both transformational and instructional leadership), presence or visibility (mentioned in instructional leadership and change management), and showing empathy (in change management and emotional intelligence). Although Leithwood and Jantzi (2005) placed individualised consideration under the category of developing people on the basis that giving personal attention to people's need for affirmation and support indirectly increases performance, we contend that this emotional aspect of leadership (Yukl, 2001) is more than just about developing people. We would argue that it is more about creating a supportive culture that communicates care and concern for people as individuals, and an understanding of the difficulties faced by the teacher in the process of innovating or, as one of the teachers, Mun Fai, said of the VP's chairing of the 2 May meeting, "affirmation" of their effort to use ICT:

We have never been taught in this way before. So it's also a learning process for us as teachers. So we are learning, at the same time, [...] we are also teaching, you know? So it's not an easy task. It's not an easy task (Liz, VP, at 2 May meeting).

Although there was evidence from the meetings and workshops that both SM and MM provided emotional support, from the frequency of mention in teachers' interviews, it appeared that SM's provision of emotional leadership was more significant to the teachers and contributed to a culture supportive of change.

*Strategic management of resources.* Beyond setting direction, developing people and redesigning organisation and culture, for ICT reforms, as confirmed by this study, the management and provision of resources is also an important aspect of leadership (Divaharan, 2007; Pate, 2006). For this leadership dimension, the difference in leadership by SM and MM was related to differences in their official positions, which provided access to different resources. In Greenville Elementary, the principal and VP were empowered to approve the use of the school's budget to purchase resources which were mainly recommended by Cassie. At Cassie's end, her role in providing teachers with access to working ICT resources was mainly a

result of her own effort, such as being the first to try out a lesson to iron out technical problems:

Today, I conducted the lesson for 4 Love and these are the few pointers to take note of: [logistical matters concerning logging in, use of Excel spreadsheet, which activity in the textbook they need not do because it had been replaced by the IT activity] (e-mail from Cassie to teachers on 4 January).

Both forms of leadership provided teachers with access to the necessary ICT resources.

A notable finding which surfaced from our case study was SM's strategic deployment of teachers to the Lead ICT reform with an eye to its sustainability and scalability. While the sustainability and scalability of ICT reform in schools is acknowledged to be an important issue (Breuleux and Laferriere, 2002; Looi *et al.*, 2006), we have yet to surface any empirical study which specifically deals with this issue. In the literature on technology implementation, there is scarce mention of manpower deployment, except from the perspective of hiring technology competent teachers (Inkster, 1998).

In Greenville Elementary, the teachers selected to be involved in the Lead ICT reform included potential heads (e.g. Sarah as the potential HOD/science) as well as existing MM (HOD/mathematics and Sarah as LH of science), thus increasing the possibility of the Lead ICT reform expanding beyond the mathematics subject and the Primary 4 level. By involving middle managers as teachers in the project, SM also ensured more intimate knowledge and understanding of the process involved in using ICT, which should translate into increased capacity to lead future uses of ICT. This was an example of SM harnessing the organisational structure to extend future leadership for ICT implementation in the school.

To spread the project to more teachers and to another level (Primary 5), SM deployed the strategy of dividing the first batch of Lead ICT teachers who taught the Primary 4 students into two groups for 2008: one group to remain in Primary 4 and the other group to move up to Primary 5. This was a deliberate "strategy" by the principal to "force" the teachers to be "one above" as they will need to "mentor" the new teachers (principal, second interview). Again, this was a strategy to expand the leadership base for ICT implementation in the school.

### Discussion

In the literature, although there are indications that besides the principal, there are others who perform instructional and transformational leadership, there is a scarcity of studies which examined how instructional and transformational leadership are shared by different people (Yukl, 2001).

In one extensive study by Leithwood *et al.* (2004) on how transformational leadership is performed by different levels of leaders, the finding was that what leaders at different levels of an organisation did was "basically the same", with the key difference being the "parts of the organisation" to which leadership was applied (p. 73). In this study, the authors summarised the transformational leadership by naming the transformational leadership function performed (such as vision and intellectual stimulation). Although Leithwood *et al.* (2004) differentiated between the effects of the leadership provided by different leadership sources, such as regional directors and teacher coordinators, they did not explicate the differences in leadership practices. We are not told the differences between say the intellectual stimulation provided by regional directors and the intellectual stimulation provided by the teacher coordinators.



In other words, there was no indication of differences between the transformational leadership provided by people who were at different levels in the chain of command.

In our study, while both SM and MM in Greenville Elementary performed transformational leadership, there were differences in the nature and purpose of the leadership provided. These differences served the complementary functions of providing leadership at the school and specific reform level, at a strategic and instructional level. The leadership performed by MM primarily resembled instructional leadership. Beyond transformational and instructional leadership, SM and MM also provided leadership through management of resources. Table III summarises the similarities and differences in the leadership provided by SM and MM in Greenville Elementary.

### Conclusion

The findings surfaced the distribution of key leadership functions and tasks in one school and how multiple leaders worked together to accomplish these functions.

Leadership provided	SM	MM
Setting directions	<p>Provided direction for ICT use by aligning it to the school's strategic thrusts of engaging students and enabling teachers. Used Lead ICT reform as a benchmark for the rest of the school</p> <p>Gave priority to engaged learning with ICT over examination results and other school activities</p>	<p>Provided benchmarks for constructivist use of ICT by modeling lesson plans and digital resources designed to engage students in their learning</p> <p>Aligned use of ICT to the specific subject curriculum</p>
Developing people	<p>Nurtured staff's positive attitude and mindset towards change and continual learning</p> <p>Empowered those with the expertise to lead in ICT implementation; groomed potential leaders</p>	<p>Worked on influencing teachers' mindset towards use of ICT to change one's instructional approach</p> <p>Provided instructional support to teachers in their design of ICT lessons through workshops and continual coaching</p>
<p>Redesigning organisation by SM</p> <p>Redesigning curriculum and assessment by MM</p>	<p>Redesigned the use of time, physical space, and organisational structure to enable instructional leadership by MM and to support the change</p> <p>Acted as a bridge between those higher and those lower in the organisational hierarchy</p> <p>Created a culture supportive of change and risk taking by providing emotional support to the teachers</p>	<p>Redesigned the curriculum to incorporate the use of ICT to provide teachers with the time to use ICT</p> <p>Redesigned assessment by reducing the content to be assessed to provide teachers with more time to use ICT</p> <p>Provided emotional support to teachers involved through empathy with their struggles</p>
Managing resources	<p>Ensured critical access to technology through approving the use of school budget for required resources</p> <p>Strategically deployed people to increase the chance of sustainability and scalability and to expand the leadership base for ICT</p>	<p>Reduced barriers to access to technology through personal effort and working with external expertise, e.g. troubleshooting wireless set up</p> <p>Deployed the teachers to develop ICT lessons for mathematics and science</p>

**Table III.**  
Distribution of leadership across senior (SM) and middle management (MM)

Although the context in Greenville Elementary is unique in some ways, such as leadership being provided mainly by a ST, in other ways, Greenville Elementary is a fairly typical school: staff with varied expertise in ICT, students with relatively low-socioeconomic status, and a principal who is not proficient in the use of ICT.

In summary, the leadership by SM and MM in Greenville Elementary were interdependent and mutually reinforcing in that important leadership functions were distributed amongst two main leadership sources and these leadership functions had impact on one another. This finding provides support for the distribution of leadership to facilitate first and second-order change as suggested by Leithwood *et al.* (2000) and Ertmer (2005). Leadership by SM was critical in enabling and empowering instructional leadership by MM, while instructional leadership by MM reinforced the strategic direction set by SM. SM led in developing a caring culture supportive of change and risk taking while MM provided teachers with the necessary knowledge and skills to implement a specific instructional change.

SM generally performed transformational, strategic leadership at the school level to effect second-order change and to grow the organisation's capacity to innovate, while MM performed instructional leadership at the project or department level to effect first-order change in teaching and learning by developing the teachers' capacity to implement a specific instructional practice. Besides instructional and transformational leadership, both SM and MM were observed to perform emotional leadership and resource management.

The study also provided strong evidence of multiple leadership roles. In contrast to the literature on technology implementation in schools where the leader mentioned is predominantly the principal (Flanagan and Jacobsen, 2003; Kincaid and Feldner, 2002), leadership for ICT implementation in Greenville Elementary was distributed among different sources of leadership that include: SM (principal and VP) and MM (HOD) as well as teachers who were invested with official leadership roles such as LH or overall in-charge of the Lead ICT reform.

The following implications for practice and research could be drawn from the study.

*Implication for Practice 1:* in this sense, the configuration of the leadership provided by SM and MM in Greenville Elementary can be used by other schools to identify the range and nature of leadership required at both the school and specific ICT reform level, and to provide the professional development required to help their staff perform these leadership functions.

*Implication for Practice 2:* the importance of facilitating leadership actions by senior managers in the form of setting aside time for ICT development, providing direction (vision) and engaging in transformational processes (changing culture and mindset) is crucial for ICT reform.

*Implication for Practice 3:* the need by leaders, in particular the principal, to provide emotional leadership is critical to motivate staff to embark on change. As discussed, emotional leadership includes the following: providing encouragement, recognition, visibility, and showing empathy.

*Implication for Practice 4:* SM and MM could provide mutually interdependent transformational and transactional leadership as both types of leadership qualities are needed for ICT reform.

*Implication for Research 1:* leadership configuration given a difference in the context. In adopting the lens of distributed leadership, the interactions of multiple leaders with their followers and the specific context constitute leadership practice (Spillane *et al.*, 2004). Based on this perspective, context is more than simply a

backdrop (Spillane *et al.*, 2001) or a background (outside of leadership practice) which influences leadership practice. The situation in which leadership occurs is not external to leadership activity; it is a core and essential component of leadership activity. This suggests the importance of studying how leadership is distributed in different contexts in which school ICT reforms could take place, so as to contribute findings which may be relevant to a larger audience.

*Implication for Research 2:* leadership configuration given a difference in the leadership source. In this research, it is possible that the leadership distribution patterns identified were due to the appointment of a ST as the official leader of the Lead ICT reform and the HOD/ICT lacking the relevant technological expertise. It would be interesting to study if the leadership configuration changes if, instead of a ST as the leader of an ICT reform in school, the main leader were part of SM, a HOD, or a teacher who is lower in the organisation hierarchy compared to a ST. Would there have been a difference in leadership configuration if a teacher had initiated the ICT reform rather than the reform being initiated by official leaders? Or would the basic configuration of transformational, instructional, and emotional leadership, supported by management of resources, still hold although the people who perform these leadership functions may differ in another context?

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