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School cultures, teachers, and technology transformation

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Abstract: This article outlines a recent study on school culture and technology adoption. Adapting Hargreaves' (2003) model of school cultures, research findings are presented on three schools involved in a study on teacher transformation using educational technology to explain how each school represents a separate school culture and school regime. Each school is profiled to demonstrate, through direct quotes from the participants, how a specific school culture or regime can reflect varying degrees of transformation, and subsequent technology adoption.

Résumé : Cet article présente une étude récente portant sur la culture scolaire et l'adoption de la technologie. En utilisant une adaptation du modèle des cultures scolaires de Hargreaves (2003), les résultats de recherche de trois écoles qui ont participé à une étude sur la transformation des enseignants utilisant la technologie éducative sont présentés afin d'expliquer comment chaque école représente une culture d'école et un régime scolaire distincts. Chaque école est profilée dans le but de démontrer, au moyen de citations directes des participants, la façon dont une culture d'école ou un régime scolaire donné peut se traduire par divers niveaux de transformation et, conséquemment, d'adoption des technologies.

Introduction

The following study examined the degree to which technology transforms teachers. That is, to what degree does the use, integration, and teaching of technology tend to cause teachers to re-examine their practices, their roles in the classroom, and their philosophies of education? A clear distinction is made between change and transformation. Change usually means altering a specific teaching strategy whereas transformation means a fundamental difference in the manner in which a teacher views his or her role as an educator as well as his or her view of teaching and learning processes. In brief, this study suggests that technology transforms teachers a great deal, and that the school culture can affect technology adoption and teacher transformation. This article examines the notion of school culture, technology adoption, and teacher transformation.

Framing the Study

A detailed discussion of the larger research study from which this study evolved is beyond the scope of this article and is discussed elsewhere (Kitchenham, 2006); however, in the interest of framing this aspect of the study, a brief overview is presented. The central research questions in the larger study asked:

- To what degree do teachers experience perspective transformations due to their educational technology development?

- Which external factors promoted or impeded the perspective transformation occurrences?
- Is transformative learning a viable research framework to describe the 10 teachers' technology development?

For the purpose of clarity, perspective transformations tend to occur when people become critically aware of how and why their psychocultural assumptions are constrained, [when people] determine what to do to revise those assumptions to make meaning from given situations, and then [when people] take some form of action to incorporate their revised frames of reference. (Kitchenham, 2006, p. 207)

In other words, the perspective transformation is at the heart of transformative learning theory as it deals with pre-existing assumptions about learning, bringing clarity for resolution of ideas in relation to situational learning, and incorporating those changes into daily teaching (Mezirow, 1991, 1998a, 1998b, 2000, 2003, 2006); all key elements in technology adoption and infusion.

In the next section, a review of the literature on school culture and change is presented. In subsequent sections, the research methodology and approach to data analysis is presented, followed by key themes that emerged from this investigation. The section concludes with an argument for the type of school culture that promotes teacher transformation through technology infusion.

Literature Review: Culture and Change

The extant literature on school culture is varied and rich (Covey, 2006; Earl & Katz, 2006; Fullan, 2001, 2007, 2008; Fullan, Hill, & Crévola, 2006; Hargreaves, 1994, 1997, 2003; Hargreaves & Fink, 2006; Hord, 1992). The majority of authors argue that culture is at the core of change and transformation. This brief review will present salient studies as they pertain to school culture and technology adoption.

Fullan (2001) presented a framework for leadership that could result in a change in school culture. The framework included five key components: (1) moral purpose (i.e., acting to bring about a positive change in employees); (2) understanding change and all its complexities; (3) relationship building; (4) knowledge creation and sharing; and (5) coherence making (i.e., bringing meaning to the ambiguities of change). He discussed several successful capacity- and knowledge-building education examples that are worthy of explanation here as they relate to dynamic changes in schools; a theme that is germane to technology transformation since dramatic and fast-moving change is a common thread within technology adoption and infusion.

Fullan and his colleagues worked with a district steering group that represented the 84 schools on the Edmonton Catholic School District on the Assessment for Learning Initiative. Fullan (2001) indicated that the "school teams examine how well students are doing, what the targets they should set to improve learning, and what strategies might get them where they want to go" (p. 100). Each school team collected data on student achievement and on the teachers' promising practices and the results were shared and discussed with other school teams. Ultimately, for each of the three years of the research, there was a Learning Fair in which all information was shared and ideas were exchanged so that the district culture was amenable to sharing ideas and practice.

The Early Years Literacy Project (EYLP) in the Toronto District involved 93 of over 600 schools. In this project, whose goal was to examine early literacy practices, the principal and the literacy coordinator worked with Fullan and his colleagues for multiple half-day professional development sessions over the school year.

As part of the research, the teams were asked to discuss the strengths of the sessions and what else they would like to learn. The results indicated that knowledge sharing opportunities were paramount for the 186 principals and literacy coordinators. In particular, the respondents asked for time to discuss reading and writing issues with each other and for opportunities to hear about ideas being implemented across the district (Fullan, 2001). In short, they were forming an argument for professional learning communities.

Fullan's (2001) third example for capacity- and knowledge-building was the York Region School District. In this study, he and his colleagues were working with the schools to focus on literacy (Performance Plus) and to increase teacher development (Mentor Teacher Project). The respective project leaders argued that there was good work being done in the projects but that the knowledge was not being shared effectively. Fullan and his colleagues worked with the district "to help it access, understand, and act further on what is already being learned" (Fullan, 2001, p. 104).

Elmore and Burney's (1999) research examined the work of an innovative superintendent and his schools in New York City. District 2 had a student population of over 22,000 with diverse cultural backgrounds. Under the leadership of the forward-thinking superintendent and within eight years, the district increased their ranking (out of 32 sub-districts) of fourth in mathematics and tenth in reading to second in both subjects. The source of their success appeared to be a concerted effort to concentrate on teaching and learning through the related strategies of intervisitation and peer networks and instructional consulting services.

Intervisitation and peer networks were a major part of the District 2 teachers' school culture transformation. That is, the teachers had opportunities to visit other school sites, within and without the district, or intervisitation, and to discuss issues with their teaching colleagues, or peer networks. Additionally, the principals engaged in their own form of intervisitations and peer networks as the junior administrators were partnered with senior administrators and often stayed two or three days to shadow the more experienced principals. The principals also engaged in monthly district-wide meetings where they frequently observed teachers' instructional practices in the host schools.

Consulting services were divided into two types: outside-district consultants and inside-district consultants. The former were often experts in their fields who were employed by universities or independent consultancies; the latter were usually hired from within the school district and therefore were employed as part of the district budget. Initially District 2 employed outside-district consultants to assist the teachers and administrators in improving their literacy instructional practices. As the practices were adopted, within-district consultants were used to work with groups of teachers and individual teachers to perfect the strategies learned. As Elmore and Burney (1999) argued, the consulting services model was labour intensive as "change in practice involves working through problems of practice with peers and experts, observation of practice, and steady accumulation over time of new practices anchored in one's own classroom setting" (p. 276). In short, the concepts of peer collaboration and expert consultation appear to be at the core of District 2's success.

In a later work, Fullan (2007) stressed that structure and culture were the two main components for changing working conditions in any organization but especially in schools. He argued that structure was the easier of the two to implement as it usually involved a pragmatic change such as altering the teaching timetable so that teachers had common time to either meet as a group or to work on their own without teaching responsibilities. Culture, or capacity, was more difficult to maintain since it was at the core of the change process.

To exemplify the components of structure and culture, Fullan (2007) cited three examples of successful organizations: the York Region District School Board, the Boston school district, and the Knowsley Local Education Authority. Each example dealt with building an appropriate structure for change and each maintained the culture to attain success.

York Region District School Board included 140 elementary and 27 secondary schools in a multicultural district of over 100 languages spoken in the schools. Their focus, the Literacy Collaborative (LC), was on improving literacy within a school capacity building framework. The staff met monthly as school-based teams, which included the principal, the lead literacy teachers, and special education teacher as the elementary level and additional teachers at the secondary level, to discuss how to improve literacy in their respective schools. The LC model contained 13 parameters which encompassed in situ literacy teachers, literacy blocks, and cross-curricular connections, to name a few. Although district-wide improvement was not evident, there was a 5% increase in literacy performance in the elementary schools and commendable performance on the Grade 10 literacy assessment for the first time. Fullan (2007) argued that the key to success not only included the requisite components of successful capacity building (set standards, assessment literacy, instructional leadership, organization capacity, and so forth) but also included a long-term vision from the leadership and a reservation of judgment on the slow or limited progress in specific schools.

Boston Public Schools (BPS) had been involved in a reform initiative for over a decade and based its plan on six key elements: “effective instruction as the core essential, student work and data, professional development, shared leadership, resources, and families and communities (Fullan, 2007, p. 223). Pertinent to school culture and technology transformation, the professional development model was based on collaborative teaching groups. In this collaborative coaching model, the teachers observed each other teach and analyzed the lessons with the assistance of skilled coaches. At the core of the model was the notion of offering constructive feedback in relation to student learning and the implementation and maintenance of a database that tracked student achievement and included promising practices for improving student achievement. Since 1999, the Grade 10 Language Arts and Grade 10 Math scores increased steadily for all race and ethnicity groups until 2004 and 2005 when the BPS experienced a plateau effect. Clearly, the collaborative approach, over several years, was a key component to bringing about student success; this culture type of working with other colleagues over an extended period of time is an effective formula for technology adoption and transformation.

Over a four-year period, the Knowsley Local Education Authority was transformed from a low-achieving educational system to one that saw literacy and numeracy scores increase when the national averages had plateaued. The Director of Education argued that, among other priorities, Knowsley ensured that teachers observed and shared their learning with each other and that small action research projects were conducted to examine their impact on student learning. In short, the district used collaboration and professional learning communities as one form of action to improve their school cultures.

These three examples demonstrate that when an organization desires large-scale reform in a dynamic topic, it needs to “[create] partnerships of engagement that mobilize the entire system” (Fullan, 2007, p. 228). Technology infusion is one such topic that requires discussion vis-à-vis professional learning communities, clear standards and goals, strong instructional leadership, and the patience to wait for change and transformation to occur.

Newman, King, and Youngs (2000) argued that the five elements of school capacity were teachers’ knowledge, skills, and dispositions, professional community, program coherence, technical resources, and principal

leadership. They conducted a two-year study with nine urban elementary schools from across the United States and found a large variance in their respective professional development models. Two researchers visited the nine schools for three days during which they observed professional development activities, interviewed school staff, and collected relevant documents on professional development and student achievement. From the initial nine schools, seven were chosen for more in-depth study; four of those were visited three more times and the remaining three were each visited one more time. Based on these data, the schools were ranked on the comprehensiveness of their professional development. The top-ranked school (7.5 out of 8.0) emphasized a professional community in which there were clearly set and staff-wide goals and staff collaboration. In other words, the entire staff shared a set of common goals that reflected their overall mission of improving the literacy levels of their students. Conversely, the lowest-ranked school (1.25 out of 8.0) was fraught with administrator and teacher turnover, fragmented professional development, and no clear or shared vision for school capacity building. The authors concluded that “professional development should be expanded beyond the improvement of individuals to improvement of other organizational resources” through collaboration with colleagues (Newman, King, & Youngs, 2000, p. 290). In other words, schools need to ensure that professional development is viewed as a commonly-shared goal of all staff and that the educational stakeholders have opportunities to discuss their own and others’ best practices.

Hargreaves’ (2003) conceptual framework, based on his research into re-culturing schools, has been used in this study to characterize the school environment differences. He argued for a

more sophisticated understanding of how cultures and contracts can contribute to reinventing public education ... so that it combines the mutual personal trust of relationships with the professional trust and accountability of performance contracts. (p. 163)

He posited a solution in the form of three culture-based regimes (strong-mutual; strong-hierarchical; weak) and two contract-based regimes (strong and weak) resulting in six possible scenarios which characterized school change.

Table 1. Culture- and contract-based regimes

		CONTRACT		CULTURE
		Weak	Strong	
Collaborative culture	Professional learning community	Strong-Mutual		
Contrived collegiality	Performance training sects	Strong-Hierarchical		
Permissive individualism	Corrosive individualism	Weak		

In brief, he described contracts as ways for schools to be rewarded (or not) for their performance while a culture regime is the ethos of the school (see Table 1). For example, a collaborative culture (characterized as a strong-mutual contract) would present a weak contract regime as it is doubtful that the culture would be driven to score well on outside performance standards and measures whereas a professional learning community (strong-mutual culture and a strong contract regime) would tend to work together for a common goal of raising performance standards.

Methodology

Data collection

In order to understand the school context and culture beyond observations or hearsay, the researcher distributed a questionnaire to each principal or head of three schools. Each administrator was given Tomei's (2002) standardized Technology Façade Checklist. According to Tomei, this questionnaire had been used extensively by researchers and practitioners interested in technology use in schools. The 20-item instrument asks a series of questions that deal with technology within the school and requires the administrators to assign a ranking according to how they measure the criterion, based on the three façade elements of: use of technology in a school (55 possible points), the necessary infrastructure (104 possible points), and viable instructional strategies (41 possible points). The overall score, which ranges from below 0 to 200 points, allows the school administrator to determine the areas of strength and growth in educational technology. Key areas of examination are technology use, the prerequisite infrastructure, and realistic instructional strategies. This instrument creates a profile of the school's present level of technology diffusion according to the principal's perspective and allows comparison with the individual teacher's technology development. Although recommended by Tomei, due to the brief period of time available for data collection, a post-administration of the Technology Façade Checklist was not carried out in this study.

To answer the questions on degree of perspective transformation and the external factors, questionnaire and semi-structured interview data were used. These two main data sources were augmented by teacher reflective journals, researcher field notes, and the administrator questionnaire on technology use.

A modified version of King's (2002d) Learning Activities Survey – Professional Development Technology (LAS-PD TECH) was used as the teacher questionnaire as it allowed for “free-response, checklists, completion statements and extended responses to identify potential perspective transformation experiences educators have had through the professional development sessions” (King, 2002d, p. 197). Each questionnaire statement was a re-wording of Mezirow's (1991) original phases of transformative learning and the respondent was asked to indicate whether he or she had experienced that phase. As well, the teachers involved in this study were invited to indicate any specific activities or events that might have contributed to their experience of that transformative learning phase. To frame the background of each participant, demographic information on age range, gender, level of teaching, and years of teaching experience was collected and also facilitated between-teacher and between-school comparisons.

The interview questions were based on the participants' reflective journal entries and their questionnaire open-ended responses. Specifically, each teacher's interview was tailor-made to the teacher so that the responses were unique to his or her responses; however, during analysis it was determined that there was an approximately 20% overlap of common questions for all teacher participants. The field notes, kept for the entire eight-month study, served as a strong link to all other data sources as the notes were derived from experiences, thought, questions, and challenges identified by the primary researcher throughout the study. It should be noted that using these converging data tools was unique to this study; however, each method has been used previously in transformative learning (Cranton, 1994, 1996, 2001; King, 2002a, 2002b, 2002c, 2002d, 2003a, 2003b; Whitelaw, Sears, & Campbell, 2004), andragogical (Kitchenham, 2001a, 2001b, 2001c, 2003), and educational technology studies (Kitchenham, 2001a, 2001b, 2001c, 2003; Tomei, 2002). Additionally, each data tool formed evidence for the notion of a school culture unique to technology transformation.

Data analysis

The initial data were divided into two broad sets to extract themes. From the first data set, the systemic external factors that appeared to promote or impede perspective transformation as the teachers interacted with technology on a daily basis were drawn out. For the second data set, the researcher used the elements of perspective transformation as typologies for categorizing the data. In total, there were 1373 statements identified that related to perspective transformation.

All data from the first and second data sets were then examined to ascertain if there was a particular type of school culture that appeared to foster technology transformation.

To decide on a school culture framework, several authors were consulted and their respective arguments were applied to the data to derive a best fit (Covey, 2006, Earl & Katz, 2006; Elmore & Burney, 1999; Fullan, 2001, 2007, 2008; Fullan et al., 2006; Hargreaves, 1994, 1997, 2003; Hargreaves & Fink, 2003; Hord, 1992; Newman et al., 2000). A brief overview of the models considered was presented in the literature review. After surveying the literature, this author determined that Hargreaves' (2003) model of school culture appeared to be the most robust and appropriate way to describe the technology transformations that occurred in the schools that were involved in this study. Most notably, the framework allowed for distinct characteristics to be present in each culture- or contract-based regime. The next section applies Hargreaves' (2003) model to the analysis of data from three specific schools used in this study on technology adoption and infusion.

Analysis

One interesting finding that emerged from this research on teacher transformation and educational technology was that the school culture appeared to affect the degree of transformation and the readiness for technology adoption. The main sources of data for characterizing the school cultures were researcher field notes, augmented by the other three data sources (reflective journal comments; teacher questionnaire responses; and semi-structured interview) and the Technology Façade Checklist (Tomei, 2002) conducted with school administrators. In relation to the differences among and between schools in this study, the three culture and two contract regimes are presented, with an explanation, in an effort to frame each school's culture. As well, each teacher in the study was invited to complete a professional growth plan in which he or she outlined what he or she wanted to learn, how long he or she wanted to spend on learning, who would assist him or her, and what would be the measure of his or her success. Table 2 summarizes the culture (strong-mutual; strong-hierarchical; weak) and contract regimes (strong; weak) for each school in this study. School profiles are presented using a pseudonym.

Table 2: Culture and regime by school

School	Culture and regime	Exemplified by
Springwood	Culture: Collaborative Culture	The teachers worked together on many <i>in situ</i> projects as well as funded projects related to university and ministerial initiatives.
	Regime: Professional Learning Community	The school's action of assisting new teachers—experienced and inexperienced—in learning about, participating in, and augmenting school-wide initiatives.
Springdale	Culture: Contrived Collegiality	Many of the teaching staff failed to initiate not only their own joint projects but also any “shared learning, and collective inquiry in such areas as action research, team-teaching, and curriculum planning.
	Regime: Performance-Training Sects	Relied on large-scale performance standards and set pedagogies.
Springtime	Culture: Permissive Individualism	Accustomed to working in isolation, to attending workshops without colleagues, and to collaborating on projects only when participation was mandatory.
	Regime: Corrosive Individualism	The school relied heavily on standardized tests, performance standards, and public image which caused the teachers to become worn down and bitter.

Springwood School

Springwood School was a state-of-the-art facility when it opened in 1996 and had considerable computer support and equipment; additionally, during the last two years, few funds were expended for computer support. The school had 330 students in grades kindergarten to seven and 13 classroom teachers, one Learning Assistance teacher, one Special Needs Support teacher, one Teacher-Librarian, and one Music teacher. There was no Technology Specialist teacher; however, the combined Grade 4 and 5 teacher was given 0.1 release time, or 2.5 hours per week, to maintain the computer lab. Springwood clearly had the necessary infrastructure to implement educational technology.

In 2003, on the British Columbia Ministry of Education's annual test of student achievement, the Foundation Skills Assessment (FSA), 51% of Grade 4 students were meeting or exceeding expectations in reading comprehension; 68% in writing; and 66% in numeracy (British Columbia Ministry of Education, 2004). Several of the teachers had been recognised for their accomplishments from Science Teacher of the Year to writing math textbooks to coordinating writing research for the Ministry of Education.

There were 48 Microsoft Windows 1998 PCs and one iBook in the school—one PC in each of the 13 classrooms and the Learning Assistance classroom, 31 in the computer lab, one in the teacher preparation room, three in the school library, and two laptops.

The student-to-computer ratio was 6.7, above the median (5.0) for medium-sized schools in Canada (Statistics Canada, 2004). The teachers were assigned one-half hour blocks in the computer lab; however, the intermediate-level teachers, Grades 4 to 7, received twice as much time, or four one-half hour blocks per week, as the primary-level teachers, kindergarten to Grade 3. This was because the principal indicated that the intermediate students were perceived as needing more time to work on more extensive projects (i.e., more time- and labour-intensive) while the primary children were described as having limited attention spans. These factors were reflected in "use of technology in a school" and "viable instructional strategies" in Tomei's model.

The budget allocated to technology spending met the Ministry of Education guidelines of 20% of the Learning Resources budget. This amount equated to \$5,000 on technology resources in the 2002 academic year and \$1,200 in 2003. In addition, Springwood was the first elementary school in British Columbia to receive a Network of Innovative Schools (NIS) grant which resulted in a \$10,000 grant for each of three years. The recognition was for outstanding and unique ways to use Information and Communications Technology (ICT) in the classroom. The school used much of the grant in the first year to purchase computer hardware; to support professional development in the second year; and to finance software and a data projector in the last year. The two main software applications used by all teachers in the school were Accelerated Reader and computerized report cards.

The principal of Springwood School was asked to complete the Technology Façade Checklist. Springwood received an overall score of 102 (of a possible 200 points) which resulted in a grade of "C-" and was characterised as in the "modest phase of the Technology Façade". As will be noted later in this paper, this belief was shared by the four participants from Springwood. The façade element of "viable instructional strategy" was clearly a strength (30 of 41 points, or 73.2%), followed by the "use of technology in a school or school district" (38 of 55 points, or 69.1%), and "the necessary infrastructure" (34 of 104 points, or 32.7%). Interestingly, the principal attributed the strength in instructional strategies to the freedom they had experienced due to the three Network of Innovative Schools grants that they had previously received. In short, Springwood appeared to have the necessary instructional strategies but not the infrastructure to support a strong cross-grade technology program. Springwood is characterized as a collaborative culture regime as the teachers worked together on many in situ projects as well as funded projects related to university and ministerial initiatives. The physical layout of the school encouraged collaboration as the school was divided into four-classroom blocks or "quads", so that an early-primary teacher was placed beside a late-intermediate teacher. As well, as part of the re-culturing process, the teachers ensured that any school change focussed on the achievement of, and benefits for, the students and on informing practice rather than on curriculum change or on improving standardized test scores. The avenue for this change was to engage in a culture contract of professional learning communities so that they could "bring together the knowledge, skills, and dispositions of

teachers in a school or across schools to promote shared learning and improvement” (Hargreaves, 2003, p. 170). This professional learning community was realized in the school’s action of assisting new teachers—experienced and inexperienced—in learning about, participating in, and augmenting school-wide initiatives. This occurred with the present project; specifically, the school elected to use the learning opportunities the researcher provided to support teachers new to the school. The administrator in Springwood saw himself as an educational follower rather than a leader. For example, he supported the teachers in their independent decision-making and took part in their learning communities.

Lastly, the actions of the Springwood teachers matched Hargreaves’ characterization of a professional learning community. In particular, they researched opportunities through their school professional development representative, sent specific needs to the researcher as the facilitator, attended my targeted technology innovation workshop, and supplied feedback on the effectiveness and efficiency of the workshop to me as the facilitator. The success rate in the completion of their professional development growth plans in this study was another indicator that this school valued collaboration and professionalism. In addition, the Springwood teachers exhibited the highest degree of transformation as measured by the number of comments related to perspective transformation and had a one hundred percent completion rate of their professional growth plans.

Springdale School

The current principal of Springdale School eschewed the opportunity to complete the Technology Façade Checklist due to the fact that she had only been in the school for five months. Her predecessor agreed to complete the survey instrument as he was much more familiar with the technology. Springdale received an overall score of 96 (48.0%) which resulted in a grade of “D+” and a qualifier of “Moderate phase of the Technology Façade”. Interestingly, this perception was not shared by the three participants in the school. The façade element of “use of technology in a school or school district” (45 of 55 points, or 81.8%) was clearly a strength, followed by the “viable instructional strategy” (25 of 41 points, or 61.0%), and “the necessary infrastructure” (26 of 104 points, or 25.0%). In short, Springdale, unlike Springwood and Springtime, appeared to demonstrate a strong use of educational technology in the school but, like Springwood and Springtime, did not have the infrastructure to support a strong cross-grade technology program. Springdale was a relatively new school as it opened in 2001. There were 296 students in grades kindergarten to six and nine full-time and six half-time classroom teachers, a half-time librarian, one Music teacher, and one Learning Assistance/Resource Room teacher. There was no Technology Specialist teacher; however, the Learning Assistance/Resource Room teacher was the “unofficial” specialist but received no release time.

In 2003, on the British Columbia Ministry of Education annual test of student achievement, the Foundation Skills Assessment (FSA), 85 percent of Grade Four students were meeting or exceeding expectations in reading comprehension; 98% in writing; and 94% in numeracy (British Columbia Ministry of Education, 2004).

There were 76 iMac computers in the school—three in each of the 12 classrooms, four in the Learning Assistance/Resource Room classroom, 32 in the computer lab, and four in the school library. The student-to-computer ratio was 3.9, below the median (5.0) for medium-sized schools in Canada (Statistics Canada, 2004). The teachers were assigned one-hour blocks in the computer lab and all classroom teachers appeared to use the time allotted to them at least once a week. The budget allocated to technology spending was aligned with the Ministry of Education guidelines of 20% of the Learning Resources budget and added up to be \$2,000.

As reported by the teachers, under the previous administration, Springdale had many initiatives and collaborative efforts imposed on the staff. This culture regime was one of contrived collegiality. Many of the teaching staff failed to initiate not only their own joint projects but also any “shared learning, and collective inquiry in such areas as action research, team-teaching, and curriculum planning” (Hargreaves, 2003, pp. 165-166). This phenomenon was evidenced in two ways, both under a previous administrator’s leadership. Firstly, many of the teachers appeared to have been zealous about the imposed Guided Reading project two years prior to this study but few had maintained the necessary practice and reflection needed for sustainable improvement. Secondly, the thrust for technology infusion across all grades, initiated by the previous administrator, was kept up very minimally, as a staff, but quite conscientiously by the three Springdale participants in this study.

Under the present administrator’s leadership, the teachers in Springdale were supported in meeting the school goals but the administrator did not take any initiative to assist the staff in technology infusion. Springdale relied on large-scale performance standards and set pedagogies which represented a culture contract of performing training sects. Hargreaves (2003) described performing training sects as groups of people who place a clear emphasis on highly-prescribed curriculum. The school remained focussed on the

achievement levels of their students and perceived the best modes of improving scores were specific teaching methods and addressing the needs of the lower-achieving students. However, the school did not appear to embrace educational technology strategies as a viable method of improving test scores. In other words, the staff believed that “outside” test scores reflected the students’ academic levels in contrast to their own curriculum-based assessments and that the methods of improving performance were to change teaching methods and to perform intensive remediation with the lower-achieving students to increase the school’s mean performance. The school shared the across-district goals of improving literacy, numeracy, and social responsibility; however, the other curricular areas appeared to receive only token emphasis. The teachers spent much of their professional development time attending in-school and district-wide professional development workshops, acquiring new strategies and strengthening existing pedagogies. To be sure, the construct of a performing training sect did bring to the forefront the importance of meeting the needs of low-achieving students and of looking carefully at the school and district goals. However, how the needs and curricula were to be approached was rarely discussed. This approach appeared to lessen the interest in technology infusion. Lastly, consistent with Hargreaves’ analysis, the teachers in Springdale appeared to exhibit deference to authority such that many of the decisions were made from a top-down, power-coercion model (Hord, 1992). The participants from this school demonstrated a moderate degree of perspective transformation and a mediocre success rate of professional development growth plan completion.

Springtime School

In Springtime School, the Head of the Junior School was requested to complete the Technology Façade Checklist for the junior school. Springtime received an overall score of 117 which resulted in a grade of “C+” and a qualifying description of “Modest phase of the Technology Façade”. Two of the three participants (C – 1 and C – 2) shared the administrator’s perception as demonstrated by their comments. The façade element of “viable instructional strategy” was clearly a strength (30 of 41 points, or 73.2%), followed by the “use of technology in a school or school district” (34 of 55 points, or 61.8%), and “the necessary infrastructure” (53 of 104 points, or 51.0%). It should be noted that the Head of the Junior School based his assessment on his own experiences as the information technology teacher and on the teaching by the Grade 6 Social Studies/Grade 7 Science, and Grade 4 teachers as the four teachers used technology extensively.

Springtime School was an independent school, divided between junior (kindergarten to Grade 7) and senior schools (Grades 8 to 12), and was founded in 1921 as a single gender school. The junior school became co-educational in 1988. The junior school had over 100 male and female students in grades kindergarten to

seven and 16 full-time teachers—12 classroom teachers, one specialist in Information Technology, Music, French, and Art, respectively. The senior school offered the entire British Columbia high school curriculum to its entire student body.

In 2003, on the Ministry of Education annual test of student achievement, the Foundation Skills Assessment (FSA), 100% of Grade Four students were meeting or exceeding expectations in reading comprehension; 100% in writing; and 100% in numeracy (British Columbia Ministry of Education, 2004).

This school assigned \$50,000 to its technology budget for the entire school, kindergarten to Grade 12; however, the majority of the operating budget was consumed by the senior school's needs. The specific breakdown for spending was hardware updates (\$15,000), SYSTEN software upgrades (\$6,000), workstation software upgrades (\$6,000), operational and maintenance contracts for software (\$3,000), new software (\$3,000), website hosting (\$30), and senior lab computer replacements (\$ 22,000). There were three computer labs with 20, 21, and 5 Dell PCs, respectively. The student-to-computer ratio was 7.2, well above the median (3.1) for medium-sized mixed elementary and secondary schools in Canada (Statistics Canada, 2004).

First priority for the booking of the labs was given to the information technology teacher, then the senior school teaching staff (Grades 8 to 12), followed by the intermediate teachers (Grades 4 to 7), and, finally, to the primary-grade teachers (kindergarten to Grade 3). The Grade 6 Social Studies and Grade 7 Science teachers, respectively, used the computer lab once or twice a week; no primary teachers reported using any of the computer labs. A data projector was available to all teachers; however, its primary purpose was to assist the Information Technology teacher in her daily teaching. The whole school used a computerized report card system based on a Microsoft Access database.

Springtime had a staff of teachers who were accustomed to working in isolation, to attending workshops without colleagues, and to collaborating on projects only when participation was mandatory. This school culture is best characterized as a regime of permissive individualism (Hargreaves, 2003). Even the physical layout of the classrooms was conducive to individualism rather than to collaboration as the elementary classroom teachers were spread out across several acres of property rather than in one section of the school as was the senior school. For instance, one teacher might teach one class of English in the main building, a Home Economics class a quarter of a mile away in the basement of the student residences, and another English class a quarter of a mile across campus in one of the portable classrooms. This sort of physical set-up creates “barriers to widespread and sustained positive educational change and classroom improvement” (Hargreaves, 2003, p. 164). Furthermore, Springtime exhibited a culture contract of corrosive individualism as the school relied heavily on standardized tests, performance standards, and public image which caused the teachers to become worn down and bitter (e.g., “We are driven by what the [parents and press] think of the school rather than what we actually do” [Charles]; “Tests are everything [but] they are not even classroom-based [since] they are standardized tests” [Betty]). The focus was on school image and content area subjects (Hargreaves, Earl, Moore, & Manning, 2000) rather than on the students and the teachers (Hargreaves, 2003). There did not appear to be any incentive to venture outside of the status quo so the teachers tended to withdraw to their classrooms and rarely communicated with their colleagues. Not surprisingly, the teachers in this school showed a low degree of perspective transformation (Kitchenham, 2006; Mezirow, 2000) and minimal success rate in the completion of their technology professional growth plans.

Concluding Remarks

The construct of school culture can be helpful to understand the global factors that contribute to the process of transformation as it relates to school environment (Kitchenham, 2006). In particular, a school philosophy that espouses the use of school funds to promote instructional technology, the consultation with all teachers regarding educational technology decisions, the encouragement of collaboration as a major habit of mind, and the creation of professional learning communities, appears to lay the foundation for transformative learning to occur (Kitchenham, 2006).

Based on findings from the three schools that were included in this study, transformation appears to lead to not only technology infusion in individual classrooms (Kelly, McCain, & Jukes, 2009) but also a sustained change in the school culture. The small sample on which these claims are based does not allow for the generalization to other schools; however, the study does provide promising findings to guide further studies that examine school culture and technology adoption. Additional research in this area, with a larger number of schools, may yield similar findings and draw similar conclusions, or point us in new directions for research. This type of study is imperative if schools hope to bring about small- or large-scale reform in an information age that must meet the needs of the digital learners in our schools today (Palfrey & Gasser, 2008).

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