

Technology Integration in a Taiwan Elementary School: Analysis of Effects of School Principal Leadership from a Change Agent Perspective

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Abstract

Narrative research method was used to determine, from a change agent perspective, how the leadership behaviors of the two elementary school principals contributed to technology integration at the school. The two principals served at the same Taiwan elementary school at different times. The findings suggest the followings: 1) the commitment of the first principal to exploring various avenues for technology acquisition at the early stage laid a strong foundation for further technology integration; 2) responsive technology acquisition behavior by the second principal encouraged teachers to experiment with technology; 3) the vision of technology for learning of the second principal engaged teachers in integrating technology in the classroom; 4) teacher empowerment by the second principal ensured that teaching effectiveness was not impaired by an excessive workload; and 5) the actions of the second principal to empower the right person as technology leader catalyzed the technology integration process.

Keywords: technology leadership; principal, technology integration, elementary education

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1. Introduction

The impact of technology on teaching and learning is a critical issue in education. Increased investment in information technology [IT] for school education is a global trend, and IT is expected to transform learning and teaching in schools. However, the application of IT in education has not met initial expectations (Dawson & Rakes, 2003; Staples, Pugach, & Himes, 2005). Technology alone cannot ensure quality learning. Ertmer (1999, 2005) described institutional and personal barriers to effective technology integration in schools. The former refers to contextual element such as technology accessibility, support, and professional development while the latter focuses on the pedagogical beliefs of teachers and their attitudes toward technology. Rogers (2000) further observed that these barriers are overlapping and interrelated and that they are dependent on the circumstances and relationships. The effective use of technology by teachers is mediated by their belief about what constitutes "good teaching" in the context of school culture (Windschitl & Sahl, 2002). Thus, technology integration is a process of transforming the thinking of educators about teaching and learning, and the role of technology in schools (Baylor & Ritchie, 2002). Therefore, effective technology integration may require cultural change in schools.

The leadership displayed by a school principal plays an important role in the cultural transformation of a school. Leadership requires the transformation of beliefs, attitudes, and behaviors (Burns, 1978; Kotter, 1998; McGee-Cooper & Trammell, 2002; Showkeir, 2002; Zaleznik, 1998). Since the principal has the most influential position in a school, the principal plays a critical role in transforming school culture (Fullan, 2003,2007; Wallace, 2008). Teachers are willing to embrace innovations and changes when they perceive empowerment by their principal (Angelle, 2010; Chen, 2008; Hallinger, 2003). Hence, technology integration as an innovation requires that principals welcome innovative change and inspire their faculty to embrace change through empowerment. Unfortunately, principals are often ill-prepared for the technology leader role (Flanagan & Jacobsen, 2003). The leadership qualities needed for principals to implement technology in schools is also poorly understood. Hence, this study explored how principals contributed to successful technology integration in a Taiwan elementary school by studying its history of technology development.

2. Methods

The purpose of this study was to assess the behaviors of school principals at Victoria Elementary School¹ at Taiwan in terms of leadership qualities that contributed to successful technology integration at the school. Hallinger (2003) demonstrated the importance of studying the leadership of principals in the school context. Yuen, Law, & Wong (2003) argued that examining the history of IT implementation in a school can reveal the challenges of integrating technology. Researchers highly recommend narrative research for studying performance of an individual in contexts (Carter, 1993; Linde, 1993; Riessman, 1993; Seidman, 2006). Thus, this study used the narrative research method to examine Victoria principals for leadership qualities that contributed to technology integration.

¹ All the names used in this paper have been changed for confidentiality purposes.

Victoria was selected for analysis for several reasons. First, it was awarded Model school for the Seed Schools for Technology Integration. Second, Victoria is a small school located on the east coast of Taiwan. The east coast was disadvantaged in terms of technology integration (Research, Development and Evaluation Commission, Executive Yuan, 2006). Finally, the community surrounding Victoria is generally not affluent. All of these factors constituted obstacles to IT implementation. Therefore, this study attempted to explore how Victoria achieved successful technology integration despite its disadvantaged status.

2.1 Research Context

The typical school administrative structure in Taiwan includes four major divisions: academic affairs, student affairs, general affairs, and student counseling. However, because of its small size, Victoria only has only two divisions: academic-student affairs, and general affairs. Because of the limited personnel in small schools such as Victoria, teachers often have double responsibilities: classroom teaching combined with administrative duties. However, the classroom teachers at Victoria do not have administrative duties because Victoria has been operating a unique school administrative system since 2001. The school administrators designated this system the DWAT (the Division of Work between Administration and Teaching) because it allows classroom teachers to focus on teaching by releasing them from administrative duties.

2.2 Participant

The key informant in this study was John, who was responsible for technology implementation at Victoria since the computer technology was first introduced there. As the director of Academic-Student Affairs Division and the most senior staff member, John was also faculty member in charge of technology integration under the SSTIP. Thus, John was the best candidate for describing the history of technology development at Victoria.

2.3 Data Collection and Analysis

The researcher interviewed the key informant at Victoria to collect the data for this study. John was interviewed for about five hours during four separate sessions to accommodate his school day schedule. The interviews were unstructured, and John was simply asked to tell stories about technology adoption at Victoria. All interviews were recorded and transcribed. The researcher first identified the events that John considered to be significant to the development of technology integration at Victoria. By analyzing the events described by John, the researcher identified what happened, who the key actors were, what they did, what the consequences were, and how these consequences affected the development of technology integration at Victoria. The leadership qualities of the two school principals emerged in the process of data analysis. Finally, the researcher e-mailed the manuscript to John to complete the member check procedure.

3. Results

3.1 Bob Initiated Technology Implementation after Foreseeing the IT Trend

Public schools on the east coast of Taiwan are considered disadvantaged because the east coast is far less developed than the west coast. John recognized how Bob contributed to the success of technology integration at Victoria. Bob foresaw the IT trend in education and took initiative to implement IT by aggressively pursuing private funding for purchasing computers. As a result, Victoria had its first computer lab before the Ministry of Education (MOE) launched its policy requiring all schools to set up computer labs.

Bob thought that if we equipped students with IT skills, they might be more competitive.....Hence, he began raising funds by convincing the parents and the community of the importance of IT in school.... Hence, we were able to set up our first computer lab².

After Bob left for another junior high school, Victoria won a prize in a National Contest on Webpage Design. John said: "We won because of the efforts in the past seven years under the leadership of Bob."

3.2 Teacher Involvement Increased because Peter Emphasized Teaching with Technology

Bob made strenuous effort to purchase equipment and assigned John to run the computer lab. However, he never asked teachers to use IT in the classroom. Bob did not communicate his vision of IT; hence, the teachers was not actively involved in technology adoption. Few were interested in learning or using those computers, and none learned how to guide the students to learn with IT.

Bob did not consider IT as something that every teacher should learn....Consequently, no one could guide students how to do things with IT.... I was the only one who used the computers to teach the students keyboarding and who encouraged them to participate in contests.... The teachers were not interested.

The increase of technology equipment did not motivate teachers to adopt technology in the classroom. Teacher involvement increased when Peter expected the teachers to use technology in the classroom. As Bob's successor, Peter had a vision of IT implementation similar to Bob's. Peter continued to prioritize technology acquisition. Unlike Bob, Peter expected the teachers to use the technology in the classroom.

As a visionary, Peter expected the teachers to use IT in the classroom.... our school participated in a governmental projectBecause of that project, the teachers began using IT for their teaching even though it was kind of teacher-centered.

² All quotes in this paper were translated into English by the researcher.

3.3 Responsive Support from Peter Encouraged Teachers to Use Technology

Peter's support and encouragement were essential to teachers' experimenting with IT. He encouraged teachers to try new ideas with IT by responding to teachers' needs regarding technology equipment. Technology acquisition was based on what the teachers needed for their innovative teaching with IT. This responsive support significantly encouraged teachers to investigate the educative value of IT. As John claimed,

The support and encouragement of Peter was crucial. Peter appreciated any new ideas proposed by the teachers. He would support whatever the teachers wanted to accomplish in their teaching with IT by finding resources for them....For example, when a teacher requested a document projector for teaching, Peter said, "I will try to get one for you."

3.4 Restructuring the Administration Gave Teachers Time for Productive Peer Interactions

Implementing the DWAT [Division of Work between Administration and Teaching] was a process of administrative restructuring in order to enable teachers to concentrate on teaching. The DWAT freed the classroom teachers from tasks irrelevant to teaching, which increased their time spent on informal social interactions. John observed that informal social interactions created a delightful climate of learning from each other, which encouraged innovative teaching and facilitated technology integration. Sharing successful experiences became part of the culture of Victoria, which encouraged the teachers to be innovative. Sharing innovative ideas.

The DWAT system distinguished our school culture from others....We are all happy with it. Peter and I wanted teachers to concentrate on their teaching....Another distinctive feature of our school culture is that teachers of the same grade interacted intensively with each other. They shared what they did in class.... They often got together when they didn't have class....Usually, there might be one or two teachers getting involved in an innovation that the administrators tried to implement at the beginning. But the others could quickly catch up because they often asked each other: "What are you doing? What have you tried?" I believe this interaction occurred because of the DWAT system. The DWAT system reduces administrative interference for the teachers, so they have more time to communicate and to exchange ideas about the curriculum and their teaching. Knowing others' successful experiences encourages them to try it themselves. I think it's kind of a silent transforming influence....This is our school culture.

3.5 Processes of Implementing DWAT as Teacher Empowerment

The DWAT implementation did not succeed overnight; the negotiation among stakeholders was time consuming. However, the processes transformed the school culture and empowered the teachers, and enhanced the mutual trust and respect between Peter and the classroom teachers. By giving up the veto, Peter showed his respect for teacher autonomy, and he sent a clear message to the teachers that he supported their empowerment.

We worked on achieving a consensus about the job descriptions for the administrators and the teachers through meetings.... One time, we discussed a job description when Peter wasn't present. When we submitted the decision to him, he opposed it. He thought the job description was unfair to the administration.... I thought it would hurt the teachers' feelings. So, I told Peter, "If you keep questioning the decision, it will end the communications. What you're doing is denying the consensus of the teachers...." Peter finally approved the resolution....I told Peter: "You must be present when we discuss any important issue involving a change of our organization. If you don't attend, you must accept the result"Empowerment leadership became our school culture.

3.6 Empowering John as a Leader Facilitated Technology Integration

Peter delegated leadership and responsibility to John. This empowerment enabled John to balance the school accountability and teacher autonomy. John understood that school accountability was very challenging for all principals. He also empathized with teachers who were concerned about overloading and losing autonomy if any principal overdid it. Hence, John convinced Peter that "sometimes, less is better."

All principals are the same. They all focus on performances and outcomes. But, we also realize that the teachers don't expect too much extra work. Administrators who always command teachers without considering their teaching loads will encounter resistance. I have discussed this with Peter: "If you want to implement any important policy or innovation, please let me discuss it with the teachers first. If the teachers don't refuse it at the very beginning, that will be easy to deal with even though they don't have strong willingness to do. But if the teachers don't support your ideas, you have to accept the fact"...The principal agreed that we need not to get involved in every project. He was satisfied that we selected some major projects and made them distinctive features of our school. I also communicated to the teachers: "The principal expects quality performance and outcomes because the parents and community hold him accountable for the school performance"...the teachers were very cooperative.

John prioritized the needs of teachers and ensured that their needs were met. Instead of increasing the teacher workload, John coordinated technology integration with their school-based curriculum development. He encouraged the teachers to consider technology when developing and implementing their school-based curriculum. He worked with them on any technical problem. Importantly, John assumed the responsibility for reporting on the outcomes of projects in order to minimize the time and energy expended by the teachers. Thus, teachers did not view technology integration as an added burden.

.....As administrators, we had to ensure that technology integration would reduce the teaching load of teachers rather adding extra work....I told them: "When you try technology integration, you should think of how to integrate technology into your curriculum together....Don't worry about the outcomes." I encouraged them not to worry about outcomes because they would have been worried about the work needed.... I took care of the final reports.

4. Discussions

Changes in an information society often require school principals to learn the art of technology leadership. Technology leadership requires not only technological understanding, but also cultural understanding, and it reflects what an organization is and should be (Annunzio, 2001). A technology leader must find new ways to motivate people, to communicate vision, and to create a culture. Hence, principals must have the flexibility needed to facilitate the transformation of school culture. They must recognize the potential of IT and must play a proactive role in the process of innovative technology diffusion (Anderson & Dexter, 2005; Creighton, 2003; Flanagan & Jacobsen, 2003; Yuen, et al., 2003).

4.1 Commitment of Principals to Equipment Acquisition is Essential for Technology Implementation

Previous studies show that lack of access to technology is a barrier to technology integration by teachers (Ertmer, 1999; Norris, Sullivan, Poirot, & Soloway, 2003). The availability of working technology is crucial to the initial implementation of technology (Kopcha, 2010). Data analysis results showed that both principals valued technology in education and that both knew the importance of technology acquisition. Hence, they prioritized technology acquisition. As previous literature indicates principals play a key role in technology acquisition because they often make the final budget decisions (ChanLin, Hong, Horng, Chang & Chu, 2006; Dawson & Rakes, 2003; Fullan, 2007). The findings of this study support previous findings that investment in technology in schools depends on to what degree a principal values technology (Flanagan & Jacobsen, 2003; Rogers, 2000). Also, the commitment of Bob and Peter to seeking technology-acquisition funds demonstrated their determination to realize their vision of school technology. This finding agrees with reports in the literature that resourceful principals make the most of their “entrepreneurial networking” to acquire the technology needed to realize their vision for school IT (Flanagan & Jacobsen, 2003).

4.2 The Vision for Learning Held by Principals Increased the Use of Technology by Teachers

The analytical results of this study indicate that the vision of technology for learning held by Peter that enabled the school to advance from technology implementation to technology integration. The use of technology in the classroom increased when Peter was principal. This finding agrees with Ertmer (1999) and Larson, Miller, & Ribble (2010) that technology integration requires more than simply technology acquisition. While expending resources on technology, school principals must have confidence that teachers can use technology efficiently to meet the needs of students (Larson, et al., 2010). The intention of principals to improve learning through technology strengthens the effective use of technology (Hayes, 2006). The finding also echoes the claims in the literature that technology integration is not scalable or sustainable unless the teachers and principal have a shared vision for technology integration based on an understanding of its power and potential for learning (Afshari, Bakar, Luan, Foui, & Samah, 2007; Anderson & Dexter, 2000, 2005; ChanLin et al., 2006; Eib, 2001; Flanagan & Jacobsen, 2003; Gosmire & Grady, 2007; Hew & Brush, 2007; Smarkola, 2008; Yuen, et al., 2003).

4.3 Principal's Responsive Support Encourages Teachers to Experiment with IT

Previous studies indicate that principals are responsible for financial infrastructure support and must empower teachers to experiment with the innovative teaching practices enabled by IT (Rogers, 2000; Webber, 2003). The unavailability and inaccessibility of needed technology may frustrate teachers and discourage them from using technology (Ertmer, 1999; Rogers, 2000). Flanagan & Jacobsen (2003) pointed out that the major challenge for principals is creating an environment in which teachers can explore and experiment with technology in meaningful, challenging, and authentic ways. Means (2010) suggested that principals must support teachers by allowing them to access necessary technology for instruction. The data analysis results in this study clearly show that Peter's practical responsive support not only conveyed a clear vision to the teachers, it also unleashes teachers' creativity needed for innovative teaching with IT. This finding is consistent with the assertion of ChanLin et al. (2006) that teachers are encouraged to take the initiative in integrating technology when their school principals are supportive.

4.4 Empowerment Catalyzes Technology Integration

The principal is a key figure in the transformation of school culture. Data analysis results showed that the process of establishing DWAT was a milestone for teacher empowerment by Peter. The power-sharing behavior by Peter also communicated to teachers that, as a principal, he respected their autonomy by giving up some control. According to Rinehart, Short, Short, & Eckley (1998), teacher empowerment depends on the willingness of the principal to overlook self-interest for the benefit of the school. Teacher empowerment is defined as administrative power sharing that allows teachers to control critical decisions (Sweetland & Hoy, 2000). Peter moved the school culture toward teacher empowerment by accepting the teachers' decisions. This finding corresponds with previous literature that culture formation is tied to principal leadership (Flanagan & Jacobsen, 2003). The substantial participation of classroom teachers is crucial for innovative change in any school (Lambert, 2002). The finding also supports the view by Wallace (2008) that any school is capable of transformation if the principal is willing to abandon self, tradition, and the status quo. As Watson & Fristrom (1990) claimed, administrators can readily catalyze school change if they empower their teachers.

4.5 Empowering Right Person to Be Technology Leader Facilitate Technology Integration

Data analysis also shows that Peter empowered John to be the technology leader at Victoria. By listening to John and taking his advices, Peter strengthened his positive relationship with the teachers. This finding supports Wallace (2008), sincere advice from subordinators enables principals to look inside and address overlooked issues which can grow into bigger problems. All principals struggle with accountability issues (Wallace, 2008) because they are held accountable for the effectiveness of their schools (Rinehart, et al., 1998). Because of Peter's empowerment, John can balance the accountability of the principal for school effectiveness with the need to maintain a reasonable teacher workload.

Wallace (2008) warned, some principals are so busy trying to be a “principal” that they forget how to be a good leader who must do what is best for the students and the teachers. John convinced Peter that sometimes, less is better. Thus, the teachers were highly cooperative. This finding supports the claim by Pfeffer (1998) that an organization can succeed only if its people are empowered and respected because people are not just workers in the organization--they are the organizational assets. This finding also corresponds to with reports that school culture is important to the effectiveness of technology use by teachers (Flanagan & Jacobsen, 2003; Rogers, 2000). Leadership is not a matter of control; empowerment gives the school principal a network of support which can become a powerful force for positive change (Wallace, 2008).

The above discussions demonstrate that the action by Peter to empower John as the technology leader was crucial to the success of technology integration at Victoria. John was talented in both technology and leadership, which significantly contributed to the health of school culture by creating a flexible and supportive environment for the teachers. As Maxwell (2005) noted, talented employees can multiply organizational effectiveness if empowered. This finding is consistent with Spreitzer, De Janasz, & Quinn’s study (1999), who found that a middle-level leader with an empowered mindset could exhibit change-oriented leadership behaviors when interacting with subordinates. This study also agrees with studies showing that, to achieve successful technology integration, principals must foster potential technology leaders by empowering them (ChanLin et al., 2006; Dawson & Rakes, 2003; Gemunden, Salomo, & Hulzle, 2007; Staples et al., 2005). In sum, to be effective as technology leaders, a principal need not necessarily be technology-savvy. The essential of a principal leadership is to identify and to empower those who are potential leaders and experts in technology integration for quality learning.

5. Conclusion

This study theoretically and empirically identified a set of positive leadership practices exhibited by the two principals, which facilitated technology integration in a Taiwan elementary school. The key findings of the study are as follows: 1) the commitment of principals to responsive technology-acquisition is crucial to technology integration; 2) a clear **shared vision of technology for learning** can engage teachers in integrating technology in classroom; 3) teacher empowerment catalyzes the technology integration process. The results of this study, however, are limited by its use of a single method of data collection from a single informant. Furthermore, the study analyzed only one school, which limits the generalization of the research conclusion. Despite its limitations, the results of this study do reveal the key elements whereby school principals can effectively implement technology integration. In future works, a comparative case-study design is highly recommended to compare schools of different sizes and in different locations.

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References

- Afshari, M., Bakar, K. A., Luan, W. S., Fooi, F. S., & Samah, B. A. (2007). Transformational leadership style and information communication technology. *European Journal of Social Sciences*, 5(3), 109-118.
- Anderson, R. E., & Dexter, S. L. (2000). School technology leadership: Incidence and Impact. Retrieved from http://www.crito.uci.edu/tlc/findings/report_6/startpage.html
- Anderson, R. E., & Dexter, S. L. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly*, 40(1), 49-82.
- Angelle, P. S. (2010). An Organizational Perspective of Distributed Leadership: A Portrait of a Middle School. *Research in Middle Level Education Online*, 33(5), 1-16.
- Annunzio, S. (2001). *eLeadership : proven techniques for creating an environment of speed and flexibility in the digital economy*. New York: Free Press.
- Baylor, A. L., & Ritchie, D. (2002). What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? *Computers & Education*, 39, 395-414.
- Burns, J. M. (1978). *Leadership*. New York: Perennial.
- Carter, K. (1993). The place of story in the study of teaching and teacher education. *Educational Researcher*, 22(2), 5-18.
- ChanLin, L. J., Hong, J. C., Horng, J. S., Chang, S. H., & Chu, H. C. (2006). Factors influencing technology integration in teaching – a Taiwanese perspective. *Innovations in Education and Training International*, 43 (1), 57-68.
- Chen, P. (2008). Strategic leadership and school reform in Taiwan. [Article]. *School Effectiveness & School Improvement*, 19(3), 293-318.
- Creighton, T. (2003). *The principal as technology leader*. Thousand Oaks, CA: Corwin Press.
- Dawson, C., & Rakes, G. C. (2003). The Influence of Principals' Technology Training on the Integration of Technology into Schools. *Journal of Research on Technology in Education*, 36(1), 29-49.
- Eib, B. J. (2001). Beyond the Bells and Whistles: Evaluating technology use in the classroom. *Principal Leadership*, 1(9), 16-23.
- Ertmer, P. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47-61.

Ertmer, P. A. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47-61.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: the final frontier in our quest for technology integration? *Educational Technology Research and Development*, 53(4), 25-39.

Flanagan, L., & Jacobsen, M. (2003). Technology leadership for the twenty-first century principal. *Journal of Educational Administration*, 41(2), 124-142.

Fullan, M. (2003). *The moral imperative of school leadership*. Thousand Oaks, CA: Corwin Press.

Fullan, M. (2007). *The new meaning of educational change* (4th ed.). New York: Teachers College, Columbia University.

Gemunden, H. G., Salomo, S., & Huzle, K. (2007). Role models for radical innovations in times of open innovation. *Creativity and Innovation*, 16(4), 408-421.

Gosmire, D., & Grady, M. L. (2007). A bumpy road: Principal as technology leader. *Principal Leadership*, 7(6), 16-21.

Hallinger, P. (2003). Leading Educational Change: reflections on the practice of instructional and transformational leadership. *Cambridge Journal of Education*, 33(3), 329-352.

Hayes, D. (2006). Making all the flashy stuff work: the role of the principal in ICT integration. *Cambridge Journal of Education*, 36(4), 565-578.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Education Technology Research & Development* (55), 223-252.

Kopcha, T. J. (2010). A systems-based approach to technology integration using mentoring and communities of practice. *Educational Technology Research & Development*, 58(2), 175-190.

Kotter, J. P. (1998). What leaders really do? *Harvard Business Review on Leadership* (pp. 37-60). Boston, MA: Harvard Business School Press.

Lambert, L. (2002). A framework for shared leadership. *Educational Leadership*, 59(8), 37-40.

Larson, L., Miller, T., & Ribble, M. (2010). 5 Considerations for Digital Age Leaders: What Principals and District Administrators Need to Know about Tech Integration Today. *Learning & Leading with Technology*, 37(4), 12-15.

Linde, C. (Ed.). (1993). *Life stories: The creation of coherence*. New York: Oxford University Press.

- Maxwell, J. C. (2005). *The 360 leader*. Nashville: Nelson Business.
- McGee-Cooper, A., & Trammell, D. (2002). From hero-as-leader to servant-leader. In L. C. Spears & M. Lawrence (Eds.), *Focus on leadership: Servant-leadership for the twenty-first century* (pp. 141-151). New York: John Wiley & Sons.
- Means, B. (2010). Technology and Education Change: Focus on Student Learning. *Journal of Research on Technology in Education*, 42(3), 285-307.
- Norris, C., Sullivan, T., Poirot, J., & Soloway, E. (2003). No Access, No Use, No Impact: Snapshot Surveys of Educational Technology in K-12. *Journal of Research on Technology in Education*, 36(1), 15-28.
- Pfeffer, J. (1998). *The human equation*. Boston: Harvard Business School Press.
- Research, Development, and Evaluation Commission, Executive Yuan (2006). 2006 Report on the elearning ability and opportunity for K-9 students. Retrieved from <http://www.rdec.gov.tw/public/Attachment/774935671.pdf>
- Riessman, C. K. (Ed.). (1993). *Narrative Analysis*. Newbury Park, CA: Sage.
- Rinehart, J., Short, P., Short, R., & Eckley, M. (1998). Teacher empowerment and principal leadership: Understanding the influence process. *Educational Administration Quarterly*, 34(1), 630-649.
- Rogers, P. L. (2000). Barriers to adopting emerging technologies in education. *Journal of Educational Computing Research*, 22(4), 455-472.
- Seidman, I. (2006). *Interviewing as qualitative research: A Guide for researchers in education and the social science* (3rd ed.). New York: Teachers College Press.
- Showkeir, J. D. (2002). The business case for servant-leadership. In L. C. Spears & M. Lawrence (Eds.), *Focus on leadership: Servant-leadership for the twenty-first century* (pp. 153-165). New York: John Wiley & Sons.
- Smarkola, C. (2008). Efficacy of a planned behavior model: Beliefs that contribute to computer usage intentions of student teachers and experienced teachers. *Computers in Human Behavior*, 24(3), 1196-1215.
- Spreitzer, G., De Janasz, S., & Quinn, R. (1999). Empowered to lead: The role of psychological empowerment in leadership. *Journal of Organizational Behavior*, 20(4), 511-526.
- Staples, A., Pugach, M. C., & Himes, D. (2005). Rethinking the Technology Integration Challenge: Cases from Three Urban Elementary Schools. *Journal of Research on Technology in Education*, 37(3), 285-311.
- Sweetland, S., & Hoy, W. (2000). School characteristics and educational outcomes: Toward an organizational model of student achievement in middle schools. *Educational Administration Quarterly*, 36(5), 703-729.

Wallace, R. (2008). *Principal to principal: Conversations in servant leadership and school transformation*. Lanham, Maryland: Rowman & Littlefield Education.

Watson, D., & Fristrom, P. (1990). Empowerment and the Collaborative Leader.. *Clearing House*, 63(8), 361-362.

Webber, C. F. (2003). New technologies and educative leadership. *Journal of Educational Administration*, 41(2), 119-123.

Windschitl, M., & Sahl, K. (2002). Tracing teachers' use of technology in a laptop computer school: The interplay of teacher beliefs, social dynamics, and institutional culture. *American Educational Research Journal*, 39(1), 165-205.

Yuen, A. H. K., Law, N., & Wong, K. C. (2003). ICT implementation and school leadership: Case studies of ICT integration in teaching and learning. *Journal of Educational Administration*, 41(2), 158-170.

Zaleznik, A. (1998). Managers and leaders: Are they different? *Harvard Business Review on Leadership* (pp. 61-88). Boston, MA: Harvard Business School Press.

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