

University of San Diego

Digital USD

---

Dissertations

Theses and Dissertations

---

2006-08-01

## Investigating Professional Development in Technology for Literacy Teachers

Michanne Hoctor EdD  
*University of San Diego*

Follow this and additional works at: <https://digital.sandiego.edu/dissertations>



Part of the [Leadership Studies Commons](#)

---

### Digital USD Citation

Hoctor, Michanne EdD, "Investigating Professional Development in Technology for Literacy Teachers" (2006). *Dissertations*. 880.

<https://digital.sandiego.edu/dissertations/880>

This Dissertation: Open Access is brought to you for free and open access by the Theses and Dissertations at Digital USD. It has been accepted for inclusion in Dissertations by an authorized administrator of Digital USD. For more information, please contact [digital@sandiego.edu](mailto:digital@sandiego.edu).

**INVESTIGATING PROFESSIONAL DEVELOPMENT IN  
TECHNOLOGY FOR LITERACY TEACHERS**

---

by

Michanne Hoctor

---

A Dissertation Submitted to the Faculty of  
San Diego State University and the University of San Diego  
in Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Education

---

Dissertation Committee:

Dana L. Grisham Chair, Ph.D., San Diego State University  
Marcie J. Bober, Ph.D., San Diego State University  
Susan M. Zgliczynski, Ph.D., University of San Diego

---

August 2006

Copyright © 2006

by

Michanne Hocter

All Rights Reserved

## DEDICATION

I am forever indebted to my parents for instilling within me the value of education and perseverance. May reaching this goal forever serve as a reminder to them of the value of their encouragement and their faith in my ability to do so. I am so appreciative of the people in my life who have supported me as I continue to learn and grow as an individual. Thanks and appreciation goes to my forever friend, my sister Darlanne, for sharing her insights with me as I blossom into a researcher. Finally, the choice to travel the path that led to the completion of this dissertation was supported whole-heartedly by my partner, Duane, and my little girl, Francine. Their patience knows no bounds.

Across the world there is a passionate love affair between children and computers . . . And more than wanting [computer technology], they seem to know that in a deep way it already belongs to them. They know they can master it more easily and more naturally than their parents. They know they are the computer generation.

—Seymour Papert  
The Connected Family, 1996

## ABSTRACT OF THE DISSERTATION

Investigating Professional Development in Technology for Literacy Teachers

by

Michanne Hoctor

Doctor of Education

San Diego State University, 2006

Citrus Heights (a pseudonym) School District is an award-winning exemplar of technology integration. This small urban district has focused its resources on the re-design of its K-8 classrooms and curriculum to support educational reform through the use of technology, including hardware, software, and teacher professional development.

Current best practices suggest that while staff development may begin with conventional in-service training, it should move quickly beyond to efforts that support teachers' development as professionals involved in decision-making, inquiry, and leadership in their classroom teaching. In order to develop as professionals, teachers specifically need help and support in integrating new knowledge and skills into their classroom practice. The case data offer valuable support for theorizing about teachers' professional development in technology that characterizes the professional literature. Another important aspect for this study is that teachers' professional development in technology may well serve to further larger goals of school reform. This is addressed in a discussion of what was observed to be the infrastructure that was created to support teachers' continuing development in technology within the district studied. Attention must be paid to this infrastructure both to understand and to affect the kind of change necessary for school reform.

This case study investigates the efficacy of the technology educational reform movement in this district. Using both qualitative and quantitative methods, the researcher collected data focusing on the factors in professional development that support or impede 3<sup>rd</sup> – 6<sup>th</sup> grade classroom teachers' meaningful integration of technology and literacy. Five broad themes emerged from the data – multi-layered, adaptive, progressive, responsive, and collaborative. This study offers a preliminary analysis of professional development structures and may be used as a guide by administrators and teacher educators.

## TABLE OF CONTENTS

	PAGE
ABSTRACT .....	vi
LIST OF TABLES.....	xiii
ACKNOWLEDGEMENTS .....	xv
CHAPTER	
1 INTRODUCTION.....	1
Purpose of the Study.....	5
Significance of the Study.....	6
Research Questions .....	8
Question One.....	8
Sub-Questions.....	9
Question Two .....	9
Sub-Questions.....	9
Limitations of the Study .....	9
Summary .....	12
Description of Chapters.....	13
Definition of Terms .....	13
2 REVIEW OF THE LITERATURE.....	18
Theoretical Perspective.....	18
What We Know about On-Going Professional Development Strategies .....	19
Workshop-Type Trainings .....	20
Observation and Assessment.....	21
Improvement Process.....	23
Inquiry .....	23
Individually-Guided Professional Development .....	24
Summary .....	25
What We Know About Good Teaching.....	27
What We Know About Teacher Education Programs.....	29

What We Know About Technology and Literacy .....	32
Summary .....	34
Institutional Barriers to Change .....	34
Time .....	34
Organization .....	35
Leadership .....	36
Resource Allocation Within School Systems .....	37
Summary .....	38
The Role of Standards in Professional Development.....	38
The Role of Learning Theory in Professional Development.....	40
Prior Knowledge.....	41
Motivation.....	41
Active Engagement.....	42
Social Learning.....	43
Summary .....	43
The Role of Conditions For Learning in Professional Development.....	44
Immersion .....	44
Demonstration .....	45
Engagement.....	45
Expectation.....	46
Responsibility .....	46
Use .....	46
Approximation.....	47
Response .....	47
Summary .....	48
Characteristics of Effective Professional Development .....	48
Purpose.....	49
Context.....	50
Process .....	51
Duration .....	51
Coherence.....	52
Participatory Leadership .....	52



Standards for Professional Development.....	53
Professional Development Models.....	54
PRLIM Model .....	54
The Learning Spiral .....	55
Stages of Implementation.....	56
Summary .....	57
Assessment of Professional Development.....	58
Conclusions.....	61
3 METHODOLOGY.....	63
Question One.....	63
Sub-Questions .....	63
Question Two.....	63
Sub-Questions .....	63
Methodological Framework.....	64
Design of Study.....	65
Data Collection Processes.....	68
Selection of Site and Participants .....	68
Instrumentation.....	69
Participant Survey Design.....	70
Participant Survey Organization.....	74
Site Administrator Interviews.....	77
Focus Group Interviews .....	78
Protection of Participants.....	80
Data Analysis .....	80
Coding the interviews .....	86
Ongoing Member-checking.....	89
Themes .....	89
Reflective Journal .....	90
Peer Debriefing.....	90
Limitations of the Study.....	91
Establishing Authenticity .....	91
Context-Specific Limitations .....	92

	Methodological Limitations .....	93
	Case Study Reporting .....	95
4	RESULTS .....	96
	Question One.....	96
	Sub-Questions .....	96
	Question Two.....	97
	Sub-Questions .....	97
	District Overview and Background Information.....	97
	Research Question One .....	99
	Sub-Question One .....	100
	Theme One: Multi-layered Approach.....	100
	Summary .....	101
	Sub-Question Two.....	102
	Phase One.....	105
	Phase Two .....	106
	Phase Three .....	107
	Phase Four .....	114
	Phase Five .....	116
	Sub-Question Three.....	117
	Summary – Question One.....	119
	Research Question Two.....	122
	Sub-Question One .....	122
	Online Survey.....	122
	Site Administrator Interviews.....	132
	Focus Group Interviews.....	136
	Summary .....	142
	Sub-Question Two.....	143
	Online Survey.....	143
	Site Administrator Interviews.....	145
	Focus Group Interviews.....	146
	Sub-Question Three.....	147
	Online Survey.....	147

Site Administrator Interviews.....	150
Focus Group Interviews.....	151
Summary .....	151
Sub-Question Four.....	152
Online Survey.....	152
Site Administrator Interviews.....	153
Focus Group Interviews.....	153
Summary .....	153
<b>5 FINDINGS, LIMITATIONS, IMPLICATIONS AND RECOMMENDATIONS.....</b>	<b>158</b>
Summary of the Study.....	159
Purpose and Rationale .....	159
Methodology .....	161
Question One.....	161
Question Two .....	161
Data Collection.....	162
Summary of Key Findings.....	163
Question One.....	164
Question Two .....	165
Discussion of Limitations.....	168
Methodological Limitations.....	168
Sampling .....	168
Instrumentation.....	169
Authenticity .....	169
Contextual Limitations .....	170
Summary .....	171
Discussion of Findings.....	171
Emergent Themes.....	171
Big Ideas Drawn From the Findings.....	173
Seeing Is Believing .....	173
I Can Do This!.....	175
Here's What I Have to Say.....	175

Sheer Frustration.....	176
All About Me – Or is it the Kids?.....	177
Recommendations .....	177
Teachers and Administrators.....	178
Staff Developers and Educational Technology Coordinators.....	178
School District Personnel.....	180
University Teacher Education Programs .....	180
Further Research .....	181
Summary .....	182
REFERENCES .....	184
APPENDICES	
A OVERALL RESEARCH DESIGN STRUCTURE .....	195
B REQUEST FOR PARTICIPATION.....	197
C INTERVIEW PROTOCOLS.....	199
D DISTRICT INFORMATION.....	202
E ONLINE SURVEY .....	205
F RESEARCH SUPPORT.....	213
G PARTICIPANT CONSENT.....	217
H TECHNOLOGY CONFIDENCE SCORES.....	219
I TECHNOLOGY INTEGRATION WEB RESOURCES.....	221

## LIST OF TABLES

	PAGE
Table 1. Support for Research Question 2, Sub-Question 1 .....	82
Table 2. Support for Research Question 2, Sub-Questions 2 and 3 .....	85
Table 3. Support for Research Question 2, Sub-Question 4 .....	86
Table 4. Support for Research Question 1 .....	87
Table 5. Phases of Citrus Heights' Reform.....	104
Table 6. Phase One of Citrus Heights' Reform.....	105
Table 7. Phase Two of Citrus Heights' Reform .....	106
Table 8. Phase Three of Citrus Heights' Reform .....	109
Table 9. Phase Four of Citrus Heights' Reform.....	114
Table 10. Phase Five of Citrus Heights' Reform.....	117
Table 11. Factors Influencing Themes.....	121
Table 12. Survey Participants' Teaching Experience.....	124
Table 13. Survey Participants' Years at Current Grade Level.....	124
Table 14. Survey Participants' Years in this District.....	124
Table 15. Survey Participants' Hours of Professional Development .....	125
Table 16. Technology Confidence relative to Teaching Experience.....	126
Table 17. Top Five Technology Confidence Indicators .....	128
Table 18. Bottom Technology Confidence Indicators.....	128
Table 19. Factors Influencing Use of Technology .....	129
Table 20. Frequency of Student Technology Use .....	130
Table 21. Significant Effect on Student Achievement.....	131
Table 22. Additional Influences on Teacher Technology Use – Administrator Perspective .....	133
Table 23. Classroom Technology Examples.....	137
Table 24. Additional Influences on Teacher Technology Use – Teacher Perspective .....	139
Table 25. Top Factors Enabling Site Implementation .....	144
Table 26. Factors that Impeded Technology Integration .....	148
Table 27. Chi-Square of Barriers by Teaching Experience .....	149

Table 28. Collaborative Input..... 152

Table 29. Over-Arching Themes ..... 173

## ACKNOWLEDGEMENTS

I am grateful to the members of my committee who helped shape this work at the conceptual level and who read and responded to multiple drafts of the text. Dr. Dana Grisham, my committee chair, supported me throughout my student tenure and my research with wise advice, sound and supportive feedback, and critical questions. Dr. Sue Zgliczynski pressed me always towards precision and clarity with my analysis, helping me envision myself as a researcher. Dr. Marcie Bober urged me to find my voice and helped strengthen me as a writer of research.

My family was very supportive of my research efforts as well. My mother was enormously helpful in the cumbersome and time-consuming process of data entry and clean up. She translated what appeared to be an insurmountable task into a manageable project. My father endured the daunting task of editing draft after draft. My sister suffered from around the globe at helping me understand the statistical analyses I was undertaking and reviewed the drafts for clarity of ideas.

I wish to thank the many teachers, administrators, and district personnel who gave their time and energy to provide the thoughtful responses that provided substance for this work. Your contributions may serve to shape the future.

Thank you to Nina for connecting me to such an extraordinary school district. Thank you to Darryl for sharing his vision of an equitable and connected learning community. And to Barbara for imagining a technology professional development program that would feature collaboration and responsiveness to teachers throughout her district.

And, finally, I will forever love Duane and Francine for their unwavering support of my work, especially when it seemed it might never end.

## CHAPTER 1

### INTRODUCTION

In today's climate of educational accountability, schools face enormous challenges in educating our students. Recent high-stakes tests based on standards increasingly drive the K-12 curriculum. Bracey (2000), in an Education Policy briefing, notes the beginning of this catch-phrase, "high-stakes testing," as a backlash to the federal legislation, known as the No Child Left Behind Act of 2001 (NCLB Act), that has resulted in teacher and administrator raises, bonuses and even jobs now being on the line. In California, comprehensive standards for the English/Language arts were developed in the areas of reading, writing, listening, and speaking. Although these areas are further examined and expanded in more specific categories, this way of operationalizing literacy learning is limiting and inaccurate. In this current information age and within an increasingly global economy, literacy changes as rapidly as new technologies are developed, (Bruce, 2004; diSessa, 2000; Dresang & McClelland, 1999; Leu & Kinzer, 2000; Reinking, McKenna, Labbo, & Kieffer, 1998; Tapscott, 1998). For example, modern conceptions of literacy have been expanded to include such knowledge and skills as, "learning, comprehending, and interacting with technology in a meaningful way" (Selfe cited in Pianfetti, 2001, p. 256). The Internet is perhaps the most transformative technology in history (McEneaney, 2000; Seely Brown, 2004; Walker, 1999), reshaping business, media, entertainment, and society in astonishing ways.

The Internet has become a vital tool in our society, bringing us closer than we ever thought possible to make learning - of all kinds, at all levels, any time, any place, any pace - a practical reality for every man, woman, and child. In 2002, the largest group of new users of the Internet was two through five year olds (U.S. Department of Education, 2003). A large number of Americans regularly use the Internet to conduct daily activities - email, shopping, banking, job hunting, word processing, etc. People who lack access to those tools are at a growing disadvantage resulting in a widening of the digital divide.

Millions still cannot access the Internet and do not understand how to use it to harness the global web of knowledge (Milken Exchange and International Society for Technology in



Education, 1999; U.S. Department of Commerce, 2004). The disadvantaged are people who do not know how to deal in information, the basic currency of the knowledge economy. They most likely do not know how to find information, how to handle it, how to trade in it, or how to invest it for their futures. These individuals, already at risk, will become increasingly marginal in the emerging knowledge economy—unless we improve our current school practices. Schools and libraries top the list of access points that serve the groups that do not have access at home. However, for all its power, the Internet is less used in education than it might be.

In 1997, Carey and Worthington studied American classroom uses of technology. They found that 90% of K thru sixth grade teachers used technology with their students and 52% had computers in their classrooms. In observing time on task, however, it appeared that students on average spent 2.9 hours playing games and 3.4 hours on drill and practice activities. More meaningful and engaged uses of technologies, like problem solving or communicating with experts (Grisham & Wolsey, in press; International Society for Technology in Education, 2003) were not in evidence. One reason for this is outlined in a more current report by the U.S. Department of Education's National Center on Educational Statistics (1998; 2003) that suggests less meaningful and engaged uses of technology are still prevalent in classrooms. The researchers posit that teachers are overwhelmed by having to learn (1) new methods of teaching, (2) while simultaneously facing the seemingly overwhelming challenge of technological innovations—many of which arrive with amazing rapidity, and (3) encountering the realities of teaching with greater diversity in their classrooms. Given such challenges, relatively few teachers (approximately 20%) reported feeling well prepared to integrate educational technology into the classroom instruction. And yet, access in schools to computers with Internet access has drastically increased with the student to computer ratio in 2003 equaling 4.4:1, up from 12.1:1 in 1998 (Parsad & Jones, 2005). Therefore, the literacy and other school curriculum need to change in order to meet the demands of a new information age. Equally as important, teachers must also be provided with knowledge about technology, integration of technology as a tool for instruction, and how technology changes the way in which children learn. This means that experienced teachers, many of whom may have been teaching for most of their careers without much reference to technology, need a professional development system to help them gain

knowledge and skills in the information technologies in order to facilitate their professional work and to help their students learn.

Because teachers are so crucial to student achievement, a number of researchers are studying the characteristics of high quality teaching (Allington, 2002; Darling-Hammond, 1997; Darling-Hammond, Holtzman, Gatlin, & Vasquez Heilig, 2005). For example, Allington (2002) identified six common characteristics in classrooms where students earn high scores on standardized tests. He refers to these six characteristics of high quality teaching – time spent on reading and writing, text choice for students, explicit and direct teaching, problem-solving talk, substantive and challenging tasks for students, and testing focused on improvement – as the six T's of effective elementary literacy instruction. In another study, Darling-Hammond (1997) found that 40 percent of the variance in students' reading and mathematics scores was directly related to teacher expertise. Darling-Hammond and colleagues conducted another study recently in Texas (Darling-Hammond, Holtzman, Gatlin, & Vasquez Heilig, 2005), which showed certified teachers consistently produce significantly stronger student achievement gains than do uncertified teachers. Simply stated, those who have completed certification training are more effective than those who have not. Allington and Darling-Hammond, along with other researchers, are studying ways to effectively provide training to teachers so that they become high quality teachers. Their work suggests that effective professional development programs may enhance teachers' knowledge and skills to the benefit of their students' academic achievement (Anders, 2000, Darling-Hammond, 1997; Darling-Hammond, et. al, 2005; Lazco-Kerr & Berliner, 2003). Models of effective professional development are discussed in more detail in chapter two.

The quality of teaching is thought to be one of the most important factors in determining student achievement (Au, 2000; Duffy, 1997; Duffy-Hester, 1999). It has been found that students in poor, inner-city schools are the least likely to have highly qualified teachers due to the fact that so many of the teachers in these inner-city schools are inexperienced and lack credentials (Center for the Future of Teaching and Learning, 2003). In some cases, this may also be due to the onset of class size reduction in California, when highly qualified teachers left inner-city assignments (Grisham, 2000). Children in poor, inner-city schools desperately need high quality teachers. Such children often score poorly on standardized tests of reading and other subject areas. Reading scores for such students often

average in the bottom 25 % on California State standardized tests. Providing well-trained and highly qualified teachers is essential in order to meet the needs of these challenging classrooms in order to lessen the literacy achievement gap.

Most professional development systems today focus on the quality of teaching, and technology, in some instances, may or may not be incorporated within these professional development systems. Many professional development opportunities are provided as a workshop, one-time or multi-day sessions, aimed at teaching a new instructional strategy or some other new activity that can be used in a classroom (NSDC, 2003). For example, recent offerings both online and presented face-to-face titled, "Literacy in the Science Classroom: Improving Science and Language Skills" (Thier, 2005) or "Professional Development to Help Teachers Implement Systematic Phonics, Spelling and Vocabulary Lessons K-3" (Fountas & Pinnell, 2005) do not address integrating technology at all, even though research has repeatedly shown that technology integrated within literacy instruction can motivate students and increase success (Bishop, 2000; Bryan, Merchant, & Cramer, 1999; Dwyer, 1995; Honey, 2002; Mann & Shafer, 1997; Padrón & Waxman, 1996, Valdez, et. al., 2000).

Recent professional development reform efforts in the state of California focus on the quality of literacy instruction as reflected by reliance on "research-based" materials and fidelity of treatment (AB466 training). Both within California and nationally, a number of policies and research projects focus on technology standards for students as well as what teachers must know and be able to do (Moursund & Smith, 2000; ISTE, 2002; and ISTE, 2003). Most recently, the release of the U. S. Department of Education's National Education Technology Plan (U.S. Department of Education, Office of Educational Technology, 2005) calls for teachers to, (1) Have a sound understanding of the skills students need to acquire, (2) design and plan for student learning experiences that are supported by technology, (3) implement curriculum that uses technology to maximize student learning, (4) use technology to facilitate a strong assessment program that includes collection, analyzing, interpreting and communication of results, (5) use technology to increase their own productivity and extend their own learning/professional development, and (6) to apply an understanding of the social, ethical, legal and human issues in the use of technology within a K-12 environment.

The experienced classroom teacher often finds that despite the teaching knowledge that professional development and years of teaching experience offer, he or she may remain a novice at integrating technology meaningfully into classroom curricula. Student teachers just beginning their teaching careers often possess the technological expertise of their generation and of that which was provided in their teacher education preparation, often increasing their ability to integrate technology into the classroom curriculum more successfully from the start of their careers (Lemke, 2003). This difference of teacher knowledge about and skill level with technology creates an inequality for children in classrooms today (Olson, 2000). Teachers need to develop the knowledge, dispositions, and practices associated with effective technology integration (Waddoups, Wentworth, & Earle, 2004). Therefore, we need to build on the knowledge of veteran teachers so they may be able to integrate technology into their curriculum in order to maximize student academic success.

### **PURPOSE OF THE STUDY**

The purpose of this case study was to learn more about the impact of an innovative approach to technology professional development, in a small, suburban school district, on third through sixth grade literacy instruction. The research literature includes much on technology integration within middle and high school classrooms, but little has been said about elementary (kindergarten through sixth grade) classrooms. Therefore, the secondary purpose of this case study is to add to the limited body of knowledge regarding successful and effective technology integration in elementary classrooms.

While statistical methods might be able to deal with situations where behavior is homogeneous and routine, case studies are needed to deal with creativity, innovation, and context (Creswell, 1997 and 2002; Patton, 2001). Therefore, a case study is appropriate for this scenario in order to document an exemplary professional development model's evolution for possible use in large, urban school districts that are working towards increased technology integration in the service of improving student literacy achievement.

The researcher examined components of a technology professional development program along with teachers' perceptions of their experiences within this program. The researcher also sought to understand relationships between teachers' perceptions of the district's professional development program and their confidence in integrating technology

into their classroom literacy teaching. Data collection centered on the way that the district's technology agenda was implemented through professional development opportunities and site-based support systems. The researcher details outcomes of district efforts as reported by teachers and administrators through a survey and both group and individual interviews.

### **SIGNIFICANCE OF THE STUDY**

The non-educational use of technology is so pervasive that Americans can hardly separate from the many activities for which they use technology. For instance, people rely on technology for daily uses (e.g. when making airline reservations; in written communication [e-mail] to friends, family around the globe, and co-workers; and paying bills to name just a few personal uses) and connecting with information that supports work efforts. These are only a few of the many aspects of our personal lives which technology in the past 30 years has revolutionized. There are also any number of workplace and/or professional uses for which new technologies have become indispensable.

There are numerous reasons why the timing is right for this research on technology-infused professional development. Specifically, in the school district in which the researcher was a peer coach, concentrated professional development focused on literacy teaching strategies has resulted in a slow positive increase in student achievement as measured by standardized test scores over the past three years (San Diego City Schools, 2003). Although these increases appear promising, the impact of technology in today's workplace and our world has been largely ignored. In a previous study (Hoctor, 2003), the researcher found that technology was marginalized by the effort of the district to increase State test scores. District teachers were so focused on their higher accountability for literacy and math instruction that they intentionally ignored the use of technology in both their teaching and for student use. However, short-term gains may disguise a long-term problem, since we know that technology can help to support and enhance the development of reading, writing, and language arts (Reinking, 1999). Teale (2002) concurs stating, "Technology profoundly affects the learning and teaching of literacy, as well as the nature of literacy itself" (p. 182).

There are many aspects of literacy and technology that children need to learn and use while in school: keyboarding; layout and design skills for creating presentations and web pages; critical thinking about video, still images, audio, and text, their interrelationships, and

how they jointly convey intended and unintended messages; skill in using software of various types; information gathering, retrieval, and copying into presentation formats; and scaling images (Labbo, 2003; ISTE, 2003; U.S. Department of Education, Office of Educational Research and Improvement, 2000, Valmont, 2000). There are, as well, many applications of literacy and technology used by children outside of school: instant messaging to communicate (and the attendant skills in making decisions about buddy list management, holding multiple conversations online, and learning and using new “IM” vocabulary), text messaging, wireless technology use for accessing networks, etc. (U.S. Department of Commerce, National Telecommunications and Information Administration, 2004).

Some children through immersion in family or peer cultures may acquire knowledge of, and expertise in, these new technologies. This is certainly true of many privileged children. For other children, especially those living in poverty, this learning must be provided in school to avoid their falling behind their more privileged peers. Because of the importance of this access to technological knowledge, teachers need to maximize teaching and learning with and about technology. And, because technology use is predominantly about communication and critical thinking (ISTE, 2003), this task falls to elementary teachers of literacy. Kindergarten through sixth grade literacy teachers need to learn these new technologies and multiple literacies themselves in order to scaffold learning activities for their students.

Recent technology standards for teachers and students (International Society for Technology in Education, 2000 & 2003), and the recent release of the National Education Technology Plan (U.S. Department of Education, 2005), have added to what the research tells us about the benefits of technology in early literacy. Many educators argue that technology integration must move higher in the priorities of districts in order to increase student literacy achievement. These technology standards are significant when viewed in terms of the lack of technology integration in the California English-Language Arts Framework. That document does not require technology mastery until fourth grade (California Department of Education, 1998). These factors result in higher stakes for both states and school districts in meeting performance goals such as the Academic Performance Index (API) and Adequate Yearly Progress (AYP) under the No Child Left Behind Act of 2001 (NCLB Act).

Given the potential of technology to impact so many aspects of daily life and knowledge, it is logical that policymakers and members of the general public feel a sense of urgency that technological literacy become a key part of the educational programs and missions of the nation's schools. Research (U.S. Department of Education, 2003) shows that a tremendous amount of money has been spent putting technology into classrooms and creating expectations for student interaction, but professional development for teachers has been less than adequate overall (U.S. Department of Education - OUS, 2000), leaving computers connected to the Internet just collecting dust in the corners of our classrooms or being used as little more than a game or toy (Hector, 2003; Moore & Page, 2002; U.S. Department of Education, 2000).

In order to provide adequate overall professional development in technology for classroom teachers, it is necessary to know what factors should be present and how they relate to and support successful professional development for classroom teachers in general. One way to begin to address this issue is to focus on a successful exemplar. Citrus Heights (a pseudonym) is an award-winning exemplar of technology integration. Over the past 5 years, this small urban district has focused its resources on the re-design of its kindergarten through eighth grade classroom curriculum to support educational reform through the use of technology, including hardware, software, and teacher professional development with the goal of increasing student academic success.

This case study investigates the reform that has taken place at Citrus Heights, focusing on the factors in professional development that support third through sixth grade classroom teachers' meaningful integration of technology and literacy.

## **RESEARCH QUESTIONS**

Two research questions form the foundation of this case study, and a number of sub-questions have been added for clarification in order to consider the relationships between teachers' perceptions of the professional development program and their confidence integrating technology.

### **Question One**

What are the components of the technology professional development used in this district?

## **SUB-QUESTIONS**

- What was the content of the technology professional development program?
- What structures, or formats, were used within the technology professional development program and within each session?
- How was the technology professional development program facilitated?
- What changes in resources occurred for and within the technology professional development program?

## **Question Two**

How do teachers perceive their ability to use technology and apply it in their teaching in order to promote student literacy learning?

## **SUB-QUESTIONS**

- What differences were noted in the teacher's ability to use technology, both professionally and with students in the classroom?
- What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?
- What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program?
- What differences were noted in the characteristics of collegiality and/or collaboration between teachers?

## **LIMITATIONS OF THE STUDY**

This examination of the quality of and potential for a specific model of professional development for teachers is admittedly context specific. Citrus Heights School District has embarked on an ambitious, large-scale reform initiative in which the premiere strategy for student success is technology professional development for its classroom teachers. Fullan (2001) reports that for change to occur, "Major investments and procedures be established that provide literacy and mathematics materials and professional development for all school leaders, staff developers, and teachers" (p. 58). A system-wide and systematic commitment to professional development is somewhat unique; thus the results of this investigation may not apply to districts exploring different solution paths in their quest to improve student achievement. This study was not designed to look broadly at professional development for teachers, nor is it intended to suggest a course of action for other school districts. The case study research was designed specifically to strategically analyze an innovative model of



professional development within the current context of Citrus Heights School District and its effect on teachers' use of technology in their classrooms, specifically focused on literacy teaching.

This district's technology professional development is nested within a *mélange* of related support strategies raising a number of interesting and relevant questions: Would the results of this investigation be the same without the feedback and accountability mechanisms that exist for site administrators? Would the results be the same without supports offered by school-site technology core teachers? In what ways are these results dependent upon or independent of the array of centrally designed professional development opportunities that encourage continuous learning for all teachers? These questions clearly extend the boundaries of inquiry beyond the scope of the current study. No attempt is made to isolate the results of this district's technology professional development from the context in which it exists. This decision respects the authenticity of this model as a component part of Citrus Heights's comprehensive professional development program. Nevertheless, this study does provide a contextualized and detailed case description of a technology innovation and the method by which it was instantiated in this particular district.

Three methodological strategies served to investigate the stated research questions: a large-scale survey, site administrator interviews, and focus group interviews. These methodological strategies impose certain limitations on the strength of the data. The surveys, individual site administrator interviews, and focus group interviews are dependent upon participants' self-analysis and self-reporting; potentially problematic response modes. Kovaleski (2001) cautions that self-reporting strategies may be impacted by any number of personal, professional, political, and environmental variables. While the response mechanisms are problematic, so too are the sampling populations.

Although all site administrators agreed to be interviewed and do not fall in this category, the focus group interviews were convenience samplings of a group that already existed within the district professional development structure. This procedure raises concerns about which sub-groups of teachers and technology core teachers elected to become part of the assessment process and which sub-groups chose not to participate. Dillman and Salant (1994) warn, "We have no way of knowing the accuracy of a non-probability sampling. It might be accurate, but then again, it might not. Hence, whatever new information is gained

through the research applies only to the sample itself” (p. 64). It is recognized that selection bias strictly limits the generalizability of all assessment data.

This district has been involved in this reform for quite some time. Yet, this researcher hasn't been associated with this district during the majority of its significant reform efforts. Many moments of insight and development cannot be replicated for the purposes of this study because people within the change process are no longer able to accurately recall how they used to feel, believe or perform. Therefore, the time constraints imposed by this study are incongruous with the change process. Focus group interviews were scheduled the month following the initial survey to allow this subset of participants additional time to consider, internalize, and conceptualize their learning. Yet even this time lag is considered insufficient to fairly assess the long-range potential and implications of this district's technology professional development in promoting teacher change.

Qualitative research design provides the researcher with an avenue to step inside the context of what is being researched. The nature of the research is descriptive and the researcher is concerned with process rather than simply with outcomes or products (Bogdan & Biklen, 1992). The description of a process or event is valuable when quantitative research designs do not provide the insight necessary to understand the participants' role in the process, and their perceptions of the experience (Gay, 1997).

According to Creswell, a researcher must “bracket” all preconceptions based upon previous experiences, “... so as not to inject hypotheses, questions, or personal experiences into the study” (Creswell, 1998).

Therefore, the following describes the previous experiences this researcher has had in order to bring to the forefront, and bracket, any preconceptions. The researcher came to this research with a background in elementary education (kindergarten through eighth grades) and additional experience and interest in technology. The extent of technology integration within her own classroom had evolved over a thirteen-year period and she began using technology for her own purposes, for example, to write her lesson plans. This use grew to include a plan book and lessons where her students used the computer for word processing. Later, the teacher became interested in software to give students practice with the skills being taught. This use then evolved into software that adapts to the user. Adapting software was intriguing and she began to investigate and use software that enabled students to create their own presentations (e.g., HyperStudio, KidPix, and Neighborhoods). And, in the final years as

a classroom teacher, technology was integrated into most activities throughout the day, for example, students were using computers to create their own stories, practice skills in literacy, math, social studies and science, interact with books, build presentations based upon favorite literature, and use technology for persuasive presentations.

While working as a technology mentor teacher for a previous school district, the researcher worked closely with teachers to integrate technology into their curriculum and she has consistently looked for ways to make learning more engaging and interesting by utilizing the strengths of the Internet and other technology. She spent many hours using a computer for her own studies and searching for lesson plan ideas. Therefore, her personal experiences with the Internet and technology, in general, alert the researcher to her presumptions: (1) the use of technology can benefit teachers in both teacher planning and classroom instruction, (2) professional development in technology integration transfers to classroom instruction, (3) technology motivates children and increases success in literacy, (4) technology is the present and the future so the only way to provide high-quality teaching is to include technology or children will finish school deficient of the skills needed in today's workforce, and (5) literacy means more than reading, writing, listening and speaking with respect to the printed page, but extends its definition to include computers and the Internet as well.

Researcher bias may act as a further limitation to this study. Although on-going attempts were made to bracket prior experiences and maintain an impartial perspective in order to view the responses of all participants in a dispassionate manner, it remains possible that bias impacted the examples that were selected for inclusion, the themes that were identified and investigated, and the way in which the data were synthesized and analyzed. To limit the potential for research bias, the survey was constructed with input from a variety of informed sources. The site administrator and focus group interviews were meticulously transcribed, and all data were carefully triangulated.

These factors impacted the purpose, design, and results of this study and yet, represent the authentic context in which the research was conducted.

## SUMMARY

The present study's primary objective was to investigate one innovative approach to professional development to support teachers' integrating technology meaningfully into

classroom curricula. To better understand their classroom practices, ways these teachers learned to integrate technology through individual efforts, work with colleagues, and formal staff development were also explored. The context in which these teachers operated was also significant, so the researcher looked at both the supports and barriers facing these teachers as they attempted to integrate technology into their classrooms. Finally, this researcher considered the influence teachers' technology self-efficacy had on their technology decisions and explored some of the effective ways that they used technology in their instruction.

### **DESCRIPTION OF CHAPTERS**

The remainder of the dissertation is organized as follows: Chapter 2 provides a theoretical framework for the study by examining the research on professional development practices for teachers. This chapter also provides a definition of the context within which educational reform is taking place and situates this case study of professional development in technology integration that differs greatly from the norm throughout the country. Lastly, chapter 2 contains a review of the study's major constructs: teacher beliefs, teacher learning, exemplary technology use in classrooms, and supports to and barriers of technology use. Chapter 3 details the methodology of the study and briefly describes the participants and settings. Chapter 4 presents a case study analysis of this exemplary professional development model and teacher perceptions of technology integration. Chapter 5 features conclusions and recommendations emerging from the study.

### **DEFINITION OF TERMS**

To alleviate confusion over certain terms that are used throughout this dissertation, the following section is designed to provide clarification as well as to define the terms. The terms are listed in alphabetic order.

*Active Learning* engages students in their own learning. Bonwell and Eison (1991) describe the essential elements of active learning as encouragement, opportunities for practice, and feedback on performance. Further, they state that, "Students must engage in such higher-order thinking tasks as analysis, synthesis, and evaluation" (Bonwell & Eison, 1991, *What is Active Learning and Why Is It Important?* ¶ 2) in order to be actively involved in their own learning. Thus, instructional strategies employed in classrooms would include reading, writing, discussion and problem-solving activities.

*Collaboration* is working together with one or more people on a common project, or towards a common goal or vision (Wikipedia, 2005; Webster's Third New International Dictionary, 2005). When applied to an academic setting, collaboration includes an understanding that participants will be jointly credited for the work completed. There are inherent barriers to collaborative work: (a) a reluctance to work or share with new people in the work and/or organization, (b) a belief that someone else has already solved the problem, but no knowledge exists to find out how the problem was solved or who solved it, (c) a hoarding of the knowledge because knowledge is seen as powerful, and (d) participants not possessing the social skills needed for collaborative work (Wikipedia, 2005). The preconditions for success of collaborative projects consist of participants having shared objectives; a sense of urgency and commitment; knowledge that it is a dynamic process; a sense of belonging together; skills needed for open communication; a mutual trust and respect for each other and the work to be accomplished; complimentary, diverse skills and knowledge; and intellectual agility (Coleman, 2002).

*Collegiality* is the relationship between members of the same faculty united in a common purpose (Wikipedia, 2005). A search of other dictionaries vetted similar and almost identical definitions (dictionaries used were Webster's, Cambridge and Encarta). The relationship between colleagues is listed as treating other members of the same organization with respect, equality and fairness (Lorenzen, 2005). In his research focused on reference desk librarians, Howze (2003) added shared authority to the definition of collegiality. Here, the definition of collegiality encompasses those that are united under one common purpose, typically that of educating America's youth, and the relationship built between them with shared decision-making power towards the achievement of the common vision.

*Constructivism* is a theory of learning based upon the idea that the learner constructs knowledge when the learner engages in mental activity. Constructivism has been defined by many sources as far back as Giambattista Vico (1668-1744), Immanuel Kant (1724-1804), Arthur Schopenhauer (1788-1860), and Hans Vaihinger (1852-1933). More recently in 1966, Bruner explained learning as, "An active process in which learners construct new ideas or concepts based upon their current/past knowledge" (Bruner, 1966). And a currently published definition can be found at Funderstanding.com, a website that defines constructivism as, "A philosophy of learning founded on the premise that, by reflecting on

our experiences, we construct our own understanding of the world we live in. Each of us generates our own rules and mental models, which we use to make sense of our experiences. Learning, therefore, is simply the process of adjusting our mental models to accommodate new experiences” (Funderstanding.com, 2004).

*High quality teaching* refers to a high level of knowledge about learners and their development, knowledge of subject matter and curriculum goals and/or state standards, and knowledge of teaching including instructional strategies and their application relevant to student needs. This definition of high quality teaching was based on the research conducted by Linda Darling-Hammond and Joan Baratz-Snowden (2005). This definition includes knowledge regarding assessment practices and skills in curriculum development.

*In-service teacher* is defined as a person currently credentialed in the State of California and contracted by a school district to work in her/his own classroom. The terms in-service/classroom teacher, veteran teacher, cooperating teacher, and mentor teacher are used in the literature with the same meaning and use implied here (Anders, Hoffman, & Duffy, 2000; Barrett, 1986; Brush, Igoe, Brinkerhoff, Glazewski, Ku, & Smith, 2001; Darling-Hammond, 1997; Dawson & Nonis, 2000; Korthagen & Kessels, 1999; Strudler & Wetzel, 1999). These terms can be used interchangeably with in-service teacher.

*Literacy* is defined as reading, writing, listening and speaking, in alignment with the California State standards Cite. Literacy resources include, but are not limited to, books, online sources, magazines, recipes, etc. The Workforce Investment Act (1998) defines literacy as "an individual's ability to read, write, speak in English, compute and solve problems at levels of proficiency necessary to function on the job, in the family of the individual and in society." This is a broader view of literacy than just an individual's ability to read, the more traditional concept of literacy used in the past. As information and technology have increasingly shaped our society, the skills we need to function successfully have gone beyond reading, and the definition of literacy has come to include the skills listed in this definition.

*Pre-service teacher* is defined as a person currently enrolled in a teaching credential program and working on her/his student teaching field experience. The use of student teacher or novice teacher is used in much of the literature with the same meaning and use implied here (Anders, Hoffman, & Duffy, 2000; Barrett, 1986; Brush, Igoe, Brinkerhoff, Glazewski,

Ku, & Smith, 2001; Darling-Hammond, 1997; Dawson & Nonis, 2000; Korthagen & Kessels, 1999; Strudler & Wetzel, 1999) and has been used interchangeably with pre-service teacher.

*Professional development* has been defined as, "... a planned, comprehensive, and systemic program of goals-driven (often competency-based) activities that promote productive change in individuals and school structures" (Bober, 2002). Due to the short time-frame of this research, professional development is defined as planned, goals-driven training to promote productive change in individual teachers for their literacy instruction with formal follow-up expected from one training session to the next, and beyond, in a teacher's literacy instruction.

*Scaffolding learning* is a phrase used to describe the support a teacher gives to the learner. "During the learning process gradually the support for students is faded so that they become self-reliant designers, and have the metacognitive skills to search for information at the right moment" (Jones, Knuth, & Duffy, 1991). This gradual release of responsibility for learning has been explained by Wilhelm, Baker, and Dube (2001, ¶ 2) in the following quote, "In the learning-centered teaching process, the teacher first models a new strategy in the context of its use and students watch. As this is done, the teacher will talk through what the strategy is, when the strategy should be used, and how to go about using it. The next step on the continuum is for the teacher to engage in the task with the students helping out. The third step is for students to take over the task of using the strategy with the teacher helping and intervening as needed. Finally, the student independently uses the strategy and the teacher watches. If particular students are more advanced, they may skip ahead to a later point on the continuum. If, on the other hand, students experience difficulty using a strategy in a particular situation, the teacher may have to move back a step by providing help, or taking over the task and asking students to help." The literature is particularly well developed with respect to the Collins-Brown-Newman (1989) model of cognitive apprenticeship, which creates opportunities for students to apply the knowledge and practice the procedures and skills in a realistic context. Cognitive apprenticeships thus enable the transfer of knowledge and skills through contextualized, situated learning that increases the learner's intrinsic motivation and facilitates meaning making during the learning process.

*Socially mediated environment* has been defined by Piaget (1950), Vygotsky (1978), and more recently by Lave and Wenger (1991). To summarize these theorists, learning occurs within a social situation. It cannot be dissociated from it and can only be understood within the context in which it occurred. These researchers put an emphasis on the social negotiation of meaning that highlights the interaction of learning in which participants share knowledge and understanding to reach a joint construction of their activity and/or world. In this view, learning and thinking are viewed as social processes occurring in a community of practice, in which members participate in a shared endeavor.

*Technology*, has been defined as, "Electronic or digital products," by Lexico Publishing Group for Dictionary.com. Random House College Dictionary Revised Edition, 2001, defines technology as, "The branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science." For the purposes of this study, technology is focused on the uses within educational environments and defined as any recently created, within the last 10 years, tool and/or software used to improve student learning. This definition in no way discounts the role of older technologies, but places the focus on the incorporation and integration of newer forms of technology. Such items could include, but are not limited to, computers, overheads, Smart Boards, personal data assistants (PDAs), etc.

*Technology integration* is defined as computer assisted teaching and/or learning. In 1999, a team of over 45 educators met and discussed the term "technology integration" as part of the AEA 7/LEA initiative called EdTech Connect (in response to the Iowa Senate File, 2063). They defined technology integration as, "The process of teaching technology (technology education) and another curricular area simultaneously, as well as, the process of using technology to enhance teaching for learning" (EdTech Connect, 1999). An example of this infusion of technology into traditional school tasks could be the use of PowerPoint for a research presentation.



## CHAPTER 2

### REVIEW OF THE LITERATURE

This critical review of the literature serves to describe, analyze and synthesize a discrete body of knowledge on professional development practices for teachers in order to add to the collective knowledge on this subject (Boote & Belle, 2005). Three inclusion criteria were used to delineate a specific body of literature for analysis: date, subject, and context. The selected literature was limited to 1980 – 2005 in order to align the study of professional development for teachers with the national response to, interest in, and implications of student academic content standards. Literature paying attention to professional development beyond content was used in order to provide the broadest possible consideration of the prevailing issues and questions. The literature includes teacher-training processes linked to both large and small school districts and state or national efforts. These boundaries were imposed to yield a generalizable summary of the paradigms, contexts, and implementation models descriptive of current teacher training practices.

This review of the literature has been organized to afford a systematic examination of: (a) the theoretical perspective on professional development, including an historical view of professional development practices, and the beliefs, conditions, and dynamics that have acted together to define the structure and presentation of professional development for teachers; (b) the definition of the context within which educational reform is taking place, including rationale for changes in teaching practices, adult learning theory and criteria for change; (c) a range of examples of professional development practices that suggest the potential for current reform efforts; and (d) examination findings. This analysis is intended to yield a studied rationale to support recommendations for and implications of improved models of professional development in technology.

#### THEORETICAL PERSPECTIVE

A summary of the research literature indicates that in order to improve educational outcomes for students there must be well-educated, reflective teachers who are adequately

supported in their effectively run classrooms. In order for teachers to be well educated and reflective, their preparation programs and on-going professional development must focus on these characteristics and promote them in relation to managing and teaching within a classroom environment. Recent work (Center for Teaching and California's Future, 2002; Farnan & Grisham, in press; Mouza, 2002; Neville, 2003; Sprinthall, 1996; Tracey, 2002; UCI Department of Education, 1992) has focused on embedding teaching knowledge and skill acquisition within a framework of classroom instruction using what we now refer to as "situated learning" experiences. Learning normally occurs as a function of the activity, context and culture in which it occurs (Lave & Wenger, 1991).

The previously mentioned studies suggest a framework focusing on teacher growth and development, collaborative programs where teachers work with other teachers through an inquiry process to further their learning, and interactive research within a community of learners, such as a school's teaching faculty. Although many school districts have put their professional development time and expense towards some of these areas, for example, teacher growth and development, the possibilities afforded by a collaborative method of professional development need further study. In the past, many large, urban districts have focused on literacy instruction and in doing so have marginalized the use of technology in support of teaching and learning. Technology has previously been thought to address some of the issues surrounding situated learning. Yet, the use of technology to further literacy acquisition and in support of teaching has yet to be fully addressed.

There are four main areas in the literature that help us gain a deeper understanding of the possibilities regarding the use of a collaborative method of professional development in response to the issue of marginalized technology in pursuit of literacy. These areas are on-going professional development strategies, good teaching, also known as best practices, teacher education programs, and technology and literacy instruction. The following explores each of these areas to lay the foundational understandings regarding this issue.

### **What We Know about On-Going Professional Development Strategies**

According to a well-recognized adult learning theorist, Malcolm Knowles, there are four assumptions about adult learning (Knowles, 1973). First, adults learn best when self-directed. They use past experiences to understand new information. They are ready to learn

new things when the information is important to their many roles in life. And, finally, adults are problem-centered learners, meaning they want to apply new information to their immediate circumstances. Knowles built a theory of adult learning that he named andragogy (Knowles, 1984). He asserted four principles for the design of adult learning based upon the assumptions within the theory of andragogy:

1. Adults need an explanation for their learning prior to and within the training session.
2. Instruction must be activities within a relevant context.
3. Learning materials and activities must allow for different levels of experience and knowledge.
4. Instruction must allow learners to construct meaning for themselves and allow for help when mistakes are made. (Knowles, 1990)

Knowles' work had a significant impact on professional development today. His work was a significant factor in reorienting adult educators from 'educating people' to 'helping them learn' (Knowles 1950; p. 6).

Professional development today is defined as, "Those processes that improve the job-related knowledge, skills, or attitudes of school employees" (Sparks & Loucks-Horsley, 1989). Within the literature, there are five basic models of professional development for teachers. These five models represent a continuum of learning opportunities ranging from direct instruction to practices that involve interactive learning embedded within a school context. These models include workshop-type trainings, observation and assessment, improvement process, inquiry and individually guided professional development.

### **WORKSHOP-TYPE TRAININGS**

Workshop-type trainings are the most prevalent model of professional development (Gall & Vojtek, 1994; Garet, et al., 2001; Lieberman, 1995; Sparks & Loucks-Horsley, 1989). This structured training format, also known as the expert presentation model, is designed to host a large group of teachers assembled to listen to a recognized educational expert in a curricular, pedagogical or theoretical field. Participants typically attend scheduled sessions after school, on weekends, or during the summer hiatus. These sessions are typically conducted with a clear set of objectives or learner outcomes, which frequently include awareness or knowledge and skill development (Sparks & Loucks-Horsley, 1989). The workshop-type training model is intended to be a cost efficient means to efficiently facilitate

the large-scale acquisition of new attitudes, skills, or knowledge and is exemplified by keynote addresses at professional conferences, inspirational speakers often employed during district orientation days to motivate teachers, and professional consultants hired to promote a commercial product or program (Thompson & Wood, 1993). The substance of the training is most commonly determined by administrators or by the trainer (Joyce & Showers, 1988).

One underlying assumption of this model is the notion that teachers can change their behaviors and learn to replicate behaviors in their classroom that were not previously in their repertoire. Joyce and Showers (1983) point out, "That teachers can be wonderful learners. They can master just about any kind of teaching strategy or implement almost any technique as long as adequate training is provided" (p. 2) and "Teachers can acquire new knowledge and skill and use it in their instructional practice when provided with adequate opportunities to learn" (p. 72). Although, these researchers conclude that adequate training opportunities include opportunities between sessions to carry out implementation plans within a teacher's own classroom, not typical for most workshop-type training sessions. Therefore, this model is characterized by the one-time, one shot example of training.

## **OBSERVATION AND ASSESSMENT**

The observation and assessment model is most often associated with a more formal evaluation process between teachers and administration. Teachers frequently have difficulty understanding the value of this model (Wise & Darling-Hammond, 1985), although, since that research, many additional forms of this model have arisen (for instance peer coaching, clinical supervision, and teacher evaluation) (Loucks-Horsley, Hewson, Love, & Stiles, 1998; Rodriguez, & Knuth, 2000; Sparks & Loucks-Horsley, 1989; Wood, & Killian, 1998). Observation and assessment of instruction are known to provide the teacher with data that can be reflected upon and analyzed for the purpose of improving student learning (Loucks-Horsley, et. al., 1998). This model provides the teacher being observed the benefits of another viewpoint of her or his behavior relative to student learning, and by receiving helpful feedback from a colleague. The observer benefits from this model by watching a colleague, preparing feedback regarding the observation, and finally, discussing this common experience. One underlying assumption is that this model is not tied strictly to the classroom, especially in the case of peer coaches. The collaborative work of peer coaching extends to

planning instruction, developing materials, determining appropriately adapted and differentiated curriculum, and extending thinking about the impact of teaching on student learning processes (Joyce & Showers, 1996).

The clinical supervision model was developed by pre-service teacher education programs in the early 1960s but has come to be used in various ways for certificated teachers. Gall and Vojtek (1994) describe three characteristics that distinguish the clinical supervision model: (a) It involves a tutorial relationship between the classroom teacher and the supervisor or mentor; (b) it is structured with repeated feedback cycles that follow the process of pre-conference, direct observation, and post-conference; and, (c) supervisors or mentors serve in this capacity based upon their broad and specific understandings of teaching and teacher development, interpersonal skills, and classroom observation strategies. This model extends beyond a pre-service context to include practicing teachers through induction and peer mentoring programs, like the peer-coaching model previously discussed. In California, for example, the Beginning Teacher Support and Assessment (BTSA) program provides intensive one-on-one assistance to novice teachers (CCTC 1992, 1998). First and second-year teachers are supported through coaching relationships with an experienced teacher in cyclical processes of observation, feedback, and reflection. Mentoring programs, like BTSA, are grounded in a view of teacher learning that is both individualized and over an extended period of time. The Connecticut Department of Education (1990) describes peer mentoring as:

An excellent experienced teacher engages in *reflection*, possesses a *repertoire* of skills, and accepts professional *responsibilities* beyond the classroom. Becoming a reflective practitioner, while at the same time expanding one's repertoire, is a developmental process that begins during one's teacher preparation and continues through one's professional career (as cited in Fraser, 1998, p.4).

The observation and assessment, or clinical supervision, model provides multiple opportunities for teachers to practice a range of instructional skills in the authentic context of their workday and to receive explicit response and individual support in structured feedback loops. Speck (1996) suggests that consistent feedback is the most compelling feature of the clinical supervision model: "Transfer of learning for adults is not automatic and must be facilitated. Coaching and other kinds of follow-up support are needed to help adult learners transfer learning into daily practice so that it is sustained" (p. 37).

## **IMPROVEMENT PROCESS**

Teachers are sometimes asked to develop or adapt curriculum, design programs, or engage in systematic school improvement processes that have as their goal the improvement of classroom instruction and/or curriculum. Typically these projects are initiated to solve a problem (Bennett, 1994; Glanz, 1999). Their successful completion may require that teachers acquire specific knowledge or skills, for instance, curriculum planning, research on effective teaching, group problem-solving strategies. This learning could be acquired through reading, discussion, observation, training, and/or trial and error. One assumption on which this model is based is that adults learn most effectively when they have a need to know or a problem to solve (Hughes, Cash, Ahwee, & Klinger, 2002). Another assumption of his model is that people working closest to the job best understand what is required to improve their performance. A third assumption is that teachers acquire important knowledge or skills through their involvement in school improvement or curriculum development processes. This model begins with the identification of a problem or need by a group of teachers, a school faculty, or a district administrator. Next, the response is formulated in a brainstorming session and into an action plan. Typically, specific knowledge or skills necessary will become evident in this phase in order to implement the plan. Finally, the plan is implemented or the product is developed and the process is assessed. If teachers are not satisfied with the results, they may return to an earlier phase and/or repeat the entire process (Richardson, 2000).

## **INQUIRY**

Teacher inquiry, also known as action research, can take many forms (Hubbard & Power, 2003). It may be an individual activity, carried out by a group of teachers or the entire school faculty, and accomplished within the context of their immediate work setting (Sagor, 1992). One of the important tenets of the inquiry approach is that research is an important activity in which teachers should be engaged. These self-directed research efforts allow teachers to test new strategies, curricula, or answer specific questions they have posed about teaching and learning. This model parallels those processes and methods used in structured educational research though at a decidedly less formal level. Gall and Vojtek (1994) note the primary goal of teacher inquiry is to inform a teacher's professional development, whereas

educational research is designed to produce a more broadly generalizable body of knowledge with the potential to inform and advance the field. Teacher inquiry is consistent with the constructivist philosophy of education that presumes individuals learn best when they are given responsibility for constructing their own knowledge and understanding (Brandt, 2000).

Learning and organizational theorists mirror this perspective in suggesting that learning is facilitated through active involvement, reflection, and both formal and informal processes of articulation (Lieberman, 1995). Gall and Vojtek (1994) add that the analytic processes embedded within the teacher inquiry model of professional development have the capacity to encourage teachers to become more reflective about their instructional skills, procedures, strategies, dispositions, and outcomes. Through teacher inquiry, teachers are supported to try out their own ideas and develop their own understandings, thus assuring the closest possible link among context, content, need, and interest (Shanker, 1996; Sagor, 1992). This teacher inquiry model can take as many forms as there are teachers to participate, yet they all have a number of elements in common: (1) the identifying of a need or problem; (2) exploring ways of collecting data that may range from literature to gathering classroom or school data; (3) analyzing data and an interpretation by the group of teachers involved with the inquiry; and finally, (4) changes in teaching are made, new data gathered and an analysis is completed to determine the effects of the intervention (Grisham, 2000; Joyce, Murphy, & Showers, 1996; Sparks, & Loucks-Horsley, 1989; Yocam, 1996).

### **INDIVIDUALLY-GUIDED PROFESSIONAL DEVELOPMENT**

Within this model, teachers drive their own learning by reading professional publications, having discussions with colleagues, and/or experimenting with new instructional strategies. This model assumes that individuals can best judge their own learning needs and that they are capable of self-direction and self-initiated learning. There are several phases within this model: (1) the identification of a need or interest outcome; (2) the development of a plan to meet the need or interest outcome; (3) the learning activity; and (4) the assessment of whether the learning meets the identified need or interest outcome. This entire process may occur in a formal or an informal process and may include one or more individual teachers. The research suggests the impact of this model to be mostly in self-perception and motivation (Murphy, 1999; Richardson, 2002; Sparks & Loucks-Horsley,

1989) for the individual teachers involved. At this point, more research is needed to link this model with higher student achievement.

## **SUMMARY**

Although workshops, individual study, and learning teams are all viable professional development options under certain circumstances, there is considerable agreement that the use of collaborative group work and learning is the most powerful mechanism for developing the “professional learning communities” needed to support on-going school improvement (Evans, 1999, Johnson, 1999, Putnam & Borko, 2000). Garmston also advocates for the value of collaborative learning teams in professional development (Garmston, 1999). As Putnam and Borko (2000) put it, “For teachers to be successful in constructing new roles, they need opportunities to participate in a professional community that discusses new teacher materials and strategies and that supports the risk-taking and struggle entailed in transforming practice” (p. 8). In fact, in several studies, teachers cite the opportunity to collaborate as the most important factor in instituting change (Bay, Reys, & Reys, 1999).

There is also research evidence that learning in groups significantly improves learning and that, although structures for group work vary widely, all are more effective than learning alone (Korthagen, 1999; Springer, Stanne, & Donovan, 1999). Not surprisingly, the features generally cited in the literature on professional development that really result in change include clear goals, pacing that responds to individual needs, relevant learning, self-reflection and assessment, effects that are immediately noticeable, practice in a risk-free environment, flexibility of the learning schedule, extended time to learn, and collaboration to refine understanding and application (Bay, Reys, & Reys, 1999; Darling-Hammond, 1999; Evans, 1999; Guskey, 1999; Korthagen, & Kessels, 1999; Sparks, 1999). Researchers cite the need for “situated learning” (Korthagen, & Kessels, 1999; Putnam & Borko, 2000) in which concrete experiences provide the foundation on which to build an understanding of theory. The most common example of situated learning theory put into practice takes place when a child learns a new language. Children are able to learn a language at a remarkably fast speed when they are actively participating in an environment where the language is spoken (Miller & Gildea, 1987).



The proponents of the theory of situated learning suggest that knowledge is being constantly constructed and re-negotiated by the learner as they are exposed to and participate in an environment in which the knowledge is practiced. The contrast to this is the traditional classroom approach which involves knowledge presented in an abstract form, such as a worksheet to develop phonics skills, where the learner is then expected to take the abstract form of the learning and apply it in a different situation, for instance, in a book while reading. There have been two approaches developed as applications of situated learning theory in teaching – anchored instruction and cognitive apprenticeship. This cognitive apprenticeship relies on the social aspects of situational learning and spells out the role of the teacher as a facilitator of learning. In this cognitive apprenticeship, learning occurs while learners are working on tasks that are slightly more difficult than they can manage independently, requiring the aid of their peers and teacher to succeed. In anchored instruction, there are two principles. The first principle states the learning and teaching activities be designed around an “anchor” which should be some sort of case study or problem situation. Second, that the curriculum materials should allow exploration by the learner and therefore, allow the learner to construct their own understanding rather than to passively accept knowledge.

Finally, a study of the effects of the Regional Technology Assistance Program (RETA), suggest that as a result of the participants’ involvement in the program’s on-going, peer-directed, constructivist-based professional development workshops, the participants were able to increase their use of technology in their classroom instruction, increase their use of certain constructivist practices, and assumed more leadership positions (Gonzales, Pickett, Hupert, & Martin, 2002). This study included pre and post training surveys, training evaluations, as well as classroom observations and interviews with teacher participants. RETA designed the workshops and their own tenets to follow the standards set forth by the National Staff Development Council (NSDC, 2001). These tenets read (Gonzales, et al, 2002, p. 3):

- Teachers need adequate time for the phases of the change process: initiation, implementation, and institutionalization.
- Teachers and staff members learn and apply collaborative skills to make shared decisions, solve problems, and work collegially.
- It is important to address diversity by providing awareness and training related to the knowledge, skills, and behaviors needed to ensure an equitable and quality education for all students.

- Educators need to create challenging, developmentally appropriate curricula that engage students in integrative ways of thinking and learning.

From the data, the majority of workshop participants with access to home computers rose from 84% to 88% by the end of the year, and Internet access at home increased from 33% to 71%. Teachers also increased their use of email and the Internet. By the end of the year, 93% indicated they had access to the Internet at school and 17% more teachers were using email on a daily basis. And, 19% more teachers used technology as an integrated part of learning by the end of the study.

More importantly for this research, a significant change was found in how teachers collaborate with one another. Participants rated their engagement in collaborative practice, with 0 indicating never and 5 indicating daily engagement. Significant increases were noted in all areas of engagement and collaboration. The teachers who participated in the workshops also went back to their school buildings and collaborated with peers to trouble-shoot software and hardware problems, developed curriculum that incorporated technology, shared resources and information, and brainstormed ways to integrate technology across their sites. In essence, they began building their own community of learners and pursued positions of leadership within their school sites, district and out into the community.

### **What We Know About Good Teaching**

Teacher expertise affects all the tasks of teaching. That is, what teachers know and can do shapes how they purposefully select texts and other materials and how effectively they present these materials in class. Their skill in assessing their students' progress also depends on how deeply they understand learning, and how well they can interpret students' discussions and written work. According to Darling-Hammond in her report to the National Commission on Teaching and America's Future (Darling-Hammond, 1997), "No other intervention can make the difference that a knowledgeable, skillful teacher can make in the learning process." (p. 8). Teacher expertise accounted for approximately 40% of the measured variance in students' achievement in reading and mathematics, which was more than any other factor alone.

In 2002, as part of the No Child Left Behind (NCLB) Act of 2001, each state receiving Title I funds now must submit a plan to the U.S. Department of Education (USDOE). This plan must demonstrate that the state has adopted challenging academic

content and student academic achievement standards to be used by the state and its local educational agencies (Holland, 2002). This act was further amended to require states to implement a plan that promotes the development of “highly qualified” teachers.

These changes lead to developing an understanding of what teacher expertise means. In a more recent report to the National Commission on Teaching and America’s Future (Carroll, 2003), the following criteria were developed to capture the meaning of high quality teaching.

- Possess a deep understanding of the subjects they teach;
- Evidence a firm understanding of how students learn;
- Demonstrate the teaching skills necessary to help all students achieve high standards;
- Create a positive learning environment;
- Use a variety of assessment strategies to diagnose and respond to individual learning needs;
- Demonstrate and integrate modern technology into curricula to support student learning;
- Collaborate with colleagues, parents and community members, and other educators to improve student learning;
- Reflect on their practice to improve future teaching and student achievement;
- Pursue professional growth in both content and pedagogy; and
- Instill a passion for learning in their students.

No one would disagree that these are noble characteristics and certainly needed in our country’s classrooms. Yet, in 1999, it was noted that more than 14% of California’s classrooms had under-qualified teachers running them (Darling-Hammond, 2000). To compound this problem, these under-qualified teachers made up 21% of the low performing third grade classrooms. The gap between what is expected of teachers and what they are trained and supported to deliver grows steadily larger as the changing demographics of student bodies pose a different set of challenges (e.g., increasingly diverse culturally, linguistically, and ethnically).

This situation is actually a symptom of a much larger issue. Retention of teachers is the underlying problem. Inexperienced teachers are in classrooms because teachers are leaving the classroom within three to five years of first walking into them because the job is much harder than they first thought, or due to retirement (Carroll, 2003; Farnan & Grisham, in press). As our population grows older, it makes sense that more and more people retire.

Furthermore, the recent budget crisis resulted in additional retirements. This turnover puts a tremendous burden on teacher preparation programs and school districts to train new teachers quickly. So, why is it that teachers coming into classrooms are ill prepared to deal with the demands today? What is happening in teacher education programs?

### **What We Know About Teacher Education Programs**

High quality teacher education programs have been studied recently in the literature. According to a study compiled by Darling-Hammond of seven exemplary teacher education programs, there are six features of a high quality teacher preparation program (Darling-Hammond, 2000).

- A common, clear vision of good teaching that is apparent in all coursework and clinical experiences;
- A curriculum grounded in substantial knowledge of child and adolescent development, learning theory, cognition, motivation, and subject matter pedagogy, taught in the context of practice;
- Extended clinical experiences (at least 30 weeks) which are carefully chosen to support the ideas and practices presented in simultaneous, closely interwoven coursework;
- Well-defined standards of practice and performance that are used to guide and evaluate coursework and clinical work;
- Strong relationships, common knowledge, and shared beliefs among school - and university - based faculty;
- Extensive use of case study methods, teacher research, performance assessments, and portfolio evaluation to ensure that learning is applied to real problems of practice.

The mere fact that multiple teacher education programs were cited within this study means that they are doing something right. Although the number of teachers graduating from credential programs has steadily increased over the last decade, the output is not keeping up with the demand for new teachers. And the prognosis is not good. The Center for Teaching and California's Future predicts more than one in five California teachers will be under prepared in the next 10 years (Center for Teaching and California's Future, 2002).

In order to optimize teacher training and professional development, one must look to the tool of technology for some of the answers. Technology can open doors previously closed to pre-service teachers. Through the use of multimedia, pre-service teachers can experience real-life classroom situations using video, and create plausible solutions that consider

multiple perspectives in the situation (i.e., the student's perspective, a parent's perspective, an administrator's perspective, and the teacher's perspective). This experience provides pre-service teachers with a "tool kit" of responses when they are in their own classrooms, thus coming into service better prepared to meet the demanding and ever-changing needs of students and schools today. One such example is the work conducted at San Diego State University led by Professor Donn Ritchie, called Technology in Literacy Education (TILE).

A recent project conducted by doctoral students, including this author, culminated in the design of a dynamic multimedia database for use in the teacher education program at California State University, Fresno (Gallegos-Butters, et. al., 2002). The database prototype was searchable with the intent that pre-service teachers would work collaboratively with each other encountering real classroom dilemmas in a multimedia setting. With the rise in availability of computers with Internet access, a web-based solution was created in order to deliver authentic case studies to pre-services teachers with the ease of accessibility that the Internet provides. These case studies provided a relational database, which can be searched in multiple ways. The pre-service teacher can run a query based on specific criteria and find case studies to problem-solve collaboratively with colleagues either in face-to-face situations or online via bulletin boards, discussion groups or designated chat rooms.

Other such tools have recently been developed. College Community Schools, in Iowa, uses a "blended learning model" for their new teacher induction program (Barnum & Paarmann, 2002). This model uses both face-to-face and online learning opportunities. This blending is composed of web-based delivery of tutorials, then sessions with district instructional leaders, principals and colleagues to process new learning, and the creation and sharing of curriculum, vision statements, and newsletters. This program is blended in another way. The fourth component is collaborative learning to, "... allow new hires to continue to refine their curricular thinking, go deeper into best practices and share their insights so the district as a whole would become smarter along with them" (Barnum & Paarmann, 2002, p. 25). This process not only benefits and supports the new hires, but also adds depth to veteran teachers' knowledge and teaching through the creation of learning cohorts that meet throughout the rest of the school year, benefits similar to those previously mentioned in the clinical supervision model of professional development. These cohorts consist of two or three new hires and one veteran teacher. They meet once a month to share ideas and build upon

each other's thinking. These groups also use email and listservs to further communicate between meetings.

Exemplary pre-service teaching programs have been the subject of much research through Preparing Tomorrow's Teachers to Use Technology project, known as PT3. One goal of this project has been to ensure that new teachers enter the classroom prepared to effectively use the computers that await them. According to Bob McLaughlin, executive director of the National Institute for Community Innovations, and Joyce Pittman, a faculty member with the University of Cincinnati Teachers College, the "digital divide," the gap between the online information "haves" and "have-nots," remains unacceptably wide. And, the reliance on broad statistics, gathered yearly through the CBEDS program, about the number of computers in the classroom glosses over such underlying problems as the ability of teachers to effectively use the technology, students' and teachers' access to computers outside of school, the lack of just-in-time technical support, and access to culturally relevant content. "If future teachers are empowered to harness the wealth of online educational material at their disposal," Pittman says, "they will be able to overcome the inequities that exist in their buildings." Therefore, the PT3 grants emphasize teacher technology training as an integral component of teacher education programs. Out of this project also came an updated version of the National Educational Technology Standards for Teachers (NETS-T, 2000). These new standards have impacted the expectations of university faculty to learn technology and then model its incorporation into their own teacher education classes furthering pre-service teachers' understanding of the use of technology within K-12 classrooms. This would imply that pre-service teachers walking into a field experience have an increase in their understanding of technology integration than their veteran counterparts.

One such report on pre-service teachers programs written by Strudler and Wetzal, notes the difficulties of technology integration during the field experience. These researchers found that technology integration opportunities for pre-service teachers during their field experience were not common (Strudler, 1999). Strudler conducted further research through the PT3 project and found several studies documenting attempts in teacher education programs to cultivate technology-rich classrooms for field placements (Brush, 2001; Dawson, 2000; Jayroe, 2001; Wetzal, 2001). These placements were successful in that findings suggest a substantial increase in technology use for the pre-service teacher. Research

conducted by Doering confirms this increase and adds that the factors influencing this increase were: the role of cooperating teachers, the availability of technology integration models, the participants' abilities to generate technology-supported lessons, instructional approaches to technology integration, and their inclination to teach technology-supported lessons without a thorough understanding of the technology itself (Doering, 2003).

### **What We Know About Technology and Literacy**

There is general agreement that computing technologies have not had a significant impact on teaching and learning in K-12 classrooms across the U.S., even though billions of dollars have been spent in purchasing, equipping, and supporting the technology. Although educational technologists support a constructivist model to facilitate the integration of technology into teaching and learning, a model that is supported by current theories on learning (Norton, 1998; Sprague, 1999), there is little in the literature that supports this type of integration. The literature suggests that sustained, lasting change is most likely to occur when teachers participate in a support network (McKenzie, 1999; Norton & Gonzales, 1998). Further, the literature advocates for a constructivist approach with teams of teachers working together using a collaborative inquiry approach to problem solving (U.S. Department of Education [ED], 2000, Becker, H. & Riel, M. 2000, Howard, B., McGee, S., Schwartz, N., & Purcell, S., 2000). According to *Does Professional Development Change Teaching Practice? Results from a Three-Year Study* (U.S. Department of Education [ED], 2000), there is, "a substantial benefit when teachers from the same school, department, or grade level participate together in technology-related professional development" (p. 48). The researchers of this study suggest that teachers who participate in professional development together benefit from relying on one another in developing technological skills and are more likely to perform collaboratively in the education of their students. This type of learning would be supported by Fosnot's (1996) general principles of learning derived from constructivism:

- Learning is not the result of development; learning is development...it requires invention and self-organization on the part of the learner...
- Disequilibrium facilitates learning. "Errors" need to be perceived as a result of learners' conceptions and therefore not minimized or avoided.
- Reflective abstraction is the driving force of learning. As meaning-makers, humans seek to organize and generalize across experiences in a representational form.
- Dialogue within a community engenders further thinking.

- Learning proceeds toward the development of structures (pp. 29-30).

Case studies conducted at nine school sites (urban, suburban, rural) suggest that technology can support student learning through collaborative inquiry, just as the previously mentioned studies support teachers. Technology provides realistic, complex environments by furnishing investigative tools and data resources and professional development, by linking classrooms with teacher partners for joint investigations (Means, 1997).

What makes it imperative that technology be used in classrooms today?

Technological applications that enable student collaboration tend to result in improved achievement. In one study, upper-grade elementary students used a software collaboration tool called Computer Supported Intentional Learning Environment (CSILE) that enabled students and teachers to create and post text and graphics to ask questions, search for other students' answers, give feedback on student responses and work and then reformulate their initial answers and questions. These students performed better on standardized tests in reading, language and vocabulary and on measures of depth of understanding, multiple perspectives and independent thought than students who did not use the software (Scardamalia, 1996).

In studies of classroom integration of technology with the National Geographic Kids Network (Newman, 1994), Apple Classroom of Tomorrow (Sandholtz, 1997), Lego Logo (Lafer, 1994), and Sky Travel (McLellan, 1994) on student collaboration, these researchers found an increased amount of information available because students shared during class time with other teams as well as with their partners, and enhanced critical thinking because students had to deal with conflicting information and ideas from multiple software programs and online sources in order to solve their problems present through computer simulations. In another study of student collaboration, when two students worked together on one computer, the student at the keyboard provided more answers during discussion while the other student asked more questions. The social interaction skills acquired through teamwork were found to be important to mastery of certain intellectual skills (Bracewell, 1996).

Yet, as a nation, we are not using the tools available to us in order to reform education. Instead, we are focused on "back to the basics" reading and math reform. It is only in small, individual projects and research by classroom teachers that we see the impact of



technology on student learning. There have been very few school-wide attempts to reform using technology as the change agent.

### **Summary**

Functional literacy means people are able to process print in their environment, for example, newspapers, official documents, an online address, television or print advertisements, etc. Everywhere you go there is a reference to an online address and retail stores boast 24-hour accessibility through specific websites. The Internet has created the necessity for new literacy skills, for example, navigation and search strategies, synthesis of new information, and problem solving (Reinking, 1999). Technology is developing rapidly and this has an impact on literacy development (Leu, & Kinzer, 2000). Therefore, it is important that we prepare our children for the workplace of tomorrow and train teachers so they can prepare children for these demands of a changing society.

### **INSTITUTIONAL BARRIERS TO CHANGE**

The training model with an expert presenter continues to endure in response to deeply institutionalized patterns of time, organization, leadership, and resource allocation within school systems (Lyons & Pinnell, 2001; Sykes, 1996). These systemic constructs act as formidable barriers to change and require further elaboration.

### **Time**

Time presents a powerful institutional challenge for educators (Arbuckle, 1997; Birman et. al., 2000; Joyce & Showers, 2002; Lyons & Pinnell, 2001; Reyni, 1996; Sparks, 1999; Sullivan, 1999). Rigid organizational patterns of time strictly limit the availability of and accessibility to professional development. Teachers, unlike some professionals, have little or no time built into their work schedules for on-going professional study (Schenk & Tyser, 1997). Most teachers spend their entire workday with students, leaving insufficient time for observation, reflection, refinement, discussion, or planning with their colleagues or other professionals. Decision-makers have responded to this scarcity of time and to the financial demands of professional development by continuing to organize large-scale, one-day workshops. The absence of on-going support is integrally related to institutional time constraints (Hughes et. al., 2002). Traditional teacher training sessions are organized as

singular events after which participants are left on their own to try to understand, practice, and refine the studied concepts and strategies. While this factory model is cost and time efficient, it does not provide teachers the necessary time to construct, internalize, apply or generalize knowledge with reference to their classroom practice (Lieberman, 1995; Robb, 2000; Thompson, 1997). Without sufficient time for formal follow-up, on-going site-level collaboration, or sustained support, these professional development forums have little chance for impact on student achievement, leaving teachers ill-prepared to meet the ever-increasing demands placed upon them (Lyons & Pinnell, 2001; Sullivan, 1999; Thompson, 1997).

The National Staff Development Council has suggested that at least 25% of educators' work time be devoted to professional learning and collaboration with colleagues (Mizell, 2001). Robb (2000) emphasizes that, "Support for teachers embarking on a journey that examines their present practices and introduces new, research-based ideas must be available over a time period of several years" (p. 19). Thompson (1997) continues this line of thinking: "Barring some catastrophic or revolutionary impact from outside the system, school improvement can only evolve over time" (p. 15). Yet, most school districts take a minimalist approach to staff development, offering their teachers as little as three to five paid days annually for the purpose of professional study (Schenk & Tyser, 1997). Institutionalizing sustained opportunities for staff development will require a fundamental reconceptualization of the ways in which teachers, schools, and school districts organize and use time (Arbuckle, 1997; Fullan, 1997; Sparks & Hirsch, 1999). As Robb notes, "Professional development takes time. There are no instant remedies" (p. 9).

### **Organization**

The organizational culture of schools is steeped in isolationism (Arbuckle, 1997). Teachers work alone in self-contained, segregated classrooms seldom interacting with their colleagues (Lyons & Pinnell, 2001). Teachers rarely observe each other's practice, rarely work together to analyze student work, and rarely reflect on the impact and implications of their individual and collective teaching. Fullan (1991) observes, "The problem of isolation is a deep-seated one. Architecture often supports it. The timetable reinforces it. Overload sustains it. History legitimates it" (p. 6).

Schools are structured in response to discrete organizational units that legitimize and protect isolationism through individual classrooms, grade level teams, subject-specific departments, and the distinctive roles of educational specialists (Lyons & Pinnell, 2001). Each of these operational structures maintains and protects a unique set of needs, interests, and experiences. Kindergarten teachers have different needs than do advanced placement calculus teachers. Speech and language pathologists have different needs than music resource teachers. A first-year teacher has a different set of needs than does a twenty-year veteran. Bilingual teachers work in ways that are distinct from their English-only colleagues. And, while these differences are deeply ingrained in the minds of teachers and the structure of schools, all teachers, regardless of their role or assignment, share the same primary responsibility – student achievement.

Establishing a shared sense of purpose, direction, urgency and vision is not an easy task, yet moving away from isolationism toward a culture of collaboration is a necessary precondition for improving professional development and learning for teachers.

“A key arena of work for professional development leaders is the building of structures within school systems that explicitly promote, protect, and set the expectation of learning for all people in schools, with a particular focus on teachers and other adults. These leaders also work hard to reduce structures that serve as barriers to professional learning. Explicit attention to structures which promote professional development is usually necessary in a culture such as ours which tends not to value it” (Arbuckle, 1997, p. 175).

By changing the culture in schools from isolationism to collaboration, the goal will be to create organizational norms in which teachers work together, learn from each other, and study together as members of a learning community (Lyons & Pinnell, 2001; Sparks, 1999).

### **Leadership**

School leadership structures act to distance professional development processes from teachers. Leadership in school systems tends to be hierarchical and unidirectional with superintendents at one end of the line of authority and teachers at the opposite end (Archer, 2001; Barker, 1998). From this position of institutional powerlessness, teachers exert little influence over the context and content of their own professional learning (Fullan & Hargreaves, 1991; Renyi, 1996; Sykes, 1996). Professional development processes are typically conceptualized by publishers or state agencies, organized by central office personnel, and delivered by a cottage industry of educational consultants. Traditional models

of mandated trainings marginalize the voice of teachers and lead to a culture of compliance, passivity, and resistance (Fullan, 1994).

Teachers are most likely to invest the necessary personal commitment for professional growth when they have input into their learning agendas (Fullan, 1997; LaPlant, 1997; Lyons & Pinnell, 2001; Robb, 2000).

“If reform plans are to be made operational – thus enabling teachers to really change the way they work – then teachers must have opportunities to discuss, think about, try out, and hone new practice. This means that they must be involved in learning about, developing, and using new ideas” (Lieberman, 1995, p. 593).

Any and all changes in the functioning of a school, including professional development, are dependent upon teacher participation, teacher desire, and teacher control (Fullan, 1994; Fullan & Hargreaves, 1991; Lyons & Pinnell, 2002; Sullivan, 1999).

### **Resource Allocation Within School Systems**

Perhaps the greatest institutional barrier to change is the bottom line – money (Alvarado, 1998; Guskey, 1997; Hirsh, 2002; Hughes, et al., 2002). Teacher training programs entail substantial costs including teacher release time, consultant fees, facilities, and materials. Most school districts do not budget sufficient funds for professional development processes (Boser, 2001). Sykes (1996) reports, “The resources devoted to professional development are too meager and their deployment too ineffective to matter” (p. 465). The National Staff Development Council has recommended that school systems dedicate no less than 10% of their annual budget to staff development (Mizell, 2001). While this is certain to cause consternation among administrators and budget analysts, the National Staff Development Council recommendation clearly acknowledges the need for an institutional commitment to the ongoing training of teachers.

Funding summarily limits professional development and defines it. The expert presentation model persists because it is cost effective. Arbuckle (1997) relates a comment made by a state commissioner of education who suggested that regional instead of only 50 teachers listening to a speaker, 250 would be able to” (p. 171). Yet continuing to invest money into ineffective professional development process is not the solution.

“In order to provide useful and effective professional development that has a meaningful effect on teacher learning and fosters improvements in the classroom practice, funds should be focused on providing high-quality professional

development experiences. This would require schools and districts either to focus resources on fewer teachers, or to invest sufficient resources to that more teachers can benefit from high-quality professional development “ (Garet et al., 2001, p. 937).

### **Summary**

The expert presentation model continues to thrive in a system that legitimizes its existence through institutional constructs including time, organization, leadership, and resource allocation. It is simultaneously the most common format for teacher training and the model most criticized in the professional literature. Educators recognize the limitations of the expert presentation model yet grapple with viable options.

“It is clear that most schools and teachers cannot produce the kinds of learning demanded by the new reforms – not because they do not want to, but because they do not know how, and the systems they work in do not support their efforts to do so: (Darling-Hammond, 1996, p. 194)

Without appropriate changes in professional development contexts, structures, and processes, standards will fail to make an enduring impact in the quality of education and standards-based education will be added to the ever-growing list of failed initiatives (Hoff, 2001). If we are serious about improving education by creating a fundamental shift in what how our children are taught. Restructuring professional development for teachers lies at the very center of the standards-based reform agenda (Alvarado, 1998; Boser, 2001; Elmore and & Burney, 1997; Hirsh, 2001; NFIE, 2000; Renyi, 1996; Sparks, 2002; Sykes, 1996).

### **THE ROLE OF STANDARDS IN PROFESSIONAL DEVELOPMENT**

Standards have become a central focus in the national debate about educational quality (Boser, 2001; Elmore, 2001; Hoff, 2001). States have invested considerable energy and political capital creating and promoting academic standards. Districts have begun the arduous process of aligning curricula, assessments, and reporting mechanisms with content standards. Schools are being held increasingly responsible for student achievement. As the response to academic standards reverberates across and throughout the educational system, it raises complex questions about the nature of teaching and learning; questions arise that challenge deeply embedded institutional and instructional practices, beliefs, and values (Stein et al., 1999).

Assuring that all students meet or exceed standards is dependent upon immensely skillful teachers (Darling-Hammond, 1998; Hirsh, 2001; Hughes et al., 2002; Lyons & Pinnell, 2001). Classroom teachers are the only real agents of school reform (Garet et al., 2001; Sykes, 1996). It is teachers who translate policy into action; who integrate the complex components of standards, curriculum, pedagogy, and assessment into a comprehensible and pragmatic whole; and who daily balance an ever-changing array of political, economic, social, and educative factors with the individual needs of children. There is considerable agreement that good teachers and good teaching matter (Darling-Hammond, 1997; Haycock, 1998; Hirsh, 2001; Lyons & Pinnell, 2001; NBPTS, 1994; Sparks, 2002). But, does the system have a shared understanding of “good” teachers and “good” teaching?

Darling-Hammond (1996) suggests that teacher training processes would be well served if they were grounded within a professional definition of good teaching; a definition that is clear, rigorous, and farsighted. The National Board for Professional Teaching Standards has published a set of standards with the capacity to: identify, measure, and promote exemplary teaching; improve student learning through processes of reflective analysis; and introduce a new and challenging conversation about practice within professional development contexts (Shapiro, 1995). The National Board standards are based upon five core propositions that provide a consistent framework for each of the thirty certification areas: (a) Teachers are committed to students and their learning, (b) teachers know the subjects they teach and how to teach those subjects to students, (c) teachers are responsible for managing and monitoring student learning, (d) teachers think systematically about their practice and learn from experience, and (e) teachers are members of learning communities (NBPTS, 1994). These standards, the profession’s own vision of excellence, can act as a conduit to improved student learning when integrated within teacher training and support programs (NBPTS, 1996).

While standards for teachers and teaching are foundational to a restructured professional development framework, they cannot stand outside the pragmatic lens of student academic content standards. These academic standards challenge teachers to think in fundamentally new ways (Darling-Hammond, 1996; Haycock, 1998; Hoff, 2001; Sykes, 1996). Teachers must have a thorough command of content and content-specific pedagogy to maximally facilitate learning (Garet et al., 2001; Schenkat & Tyser, 1997). They must be able

to integrate curricular programs, instructional materials, and assessment results into daily instruction that is facilitative and generative (Lyons & Pinnell, 2001). Teachers must be able to differentiate their instructional programs to allow each child to meet or exceed the standards (Gregory & Chapman, 2002; Tomlinson, 1999). In preparing teachers to think and work in new ways, professional development forums need to provide specific support in benchmarking best practices, analyzing student work, and using student achievement data to inform and monitor instruction (Schmoker, 1996; Tucker & Coddling, 1998).

While teaching and learning standards will assume the centerpiece of a responsive professional development program, they do not form a complete or comprehensive agenda. A vast array of topics is necessary for teachers' ongoing training. Darling-Hammond (1998) offers the following list to suggest the range, scope, and magnitude of professional development content: (a) learning theory; (b) specific subject matter and interdisciplinary content knowledge; (c) child and adolescent development; (d) social, cognitive, physical, emotional, and motivational constructs; (e) diverse cultures and family experiences; (f) language acquisition; (g) special learning needs; (h) analysis, assessment, and evaluation strategies; (i) curricular, technological, and human resources; (j) collaboration and communication; and (k) reflective practice. This formidable inventory of sophisticated domains of knowledge serves as a reminder that learning to teach is a complex, career-long process; a process that requires systematic training, ongoing support, and time. Yet any discussion of what teachers need to know would be incomplete without a parallel discussion of how teachers learn.

### **THE ROLE OF LEARNING THEORY IN PROFESSIONAL DEVELOPMENT**

Few would argue that classroom teachers should know the theories, principles, characteristics, and implications of how, why, and when children and adolescents learn. Knowledge of learning is a keystone concept for teachers and the teaching profession. Paradoxically, this emphasis on learning process has been conspicuously absent from most professional development practices (Boyd, 1993; Lieberman, 1995). Learning and organizational theorists suggest that adult learners share several essential characteristics with their younger counterparts: (a) all learners bring prior knowledge, beliefs, and assumptions to new experiences; (b) all learners must be motivated to acquire new skills, knowledge,

abilities, or dispositions; (c) all learners must be actively engaged in the learning process, and (d) all learners construct meaning within social contexts (Boyd, 1993; Lyons & Pinnell, 2001). Each of these characteristics requires elaboration in order to establish the implications for professional development structures and processes.

### **Prior Knowledge**

It is widely recognized that prior knowledge, including misinformation and misconceptions, impacts new learning (Costa, Lipton & Wellman, 1997). Robb (2000) notes, "Adult learners reinvent, reorganize, and construct knowledge by actively linking new information to what they already know" (p. 14). Teachers bring a wide range of interests and competencies to bear on learning based on their specific classroom contexts and career stage (Robb, 2000; Speck, 1996). Teachers also bring a vast repertoire of acquired ideas, beliefs, values, and passions about education that can either enhance or impede their learning (Sharp, 1993). This is not to suggest that adults are resistant to new learning. In fact, Lyons and Pinnell (2001) suggest that teachers are likely to be flexible learners as a result of their experiences with differing learning contexts and teaching approaches.

While the diverse experiences of adult learners can provide a rich resource for staff developers and participants, it can also present significant design and facilitation challenges. The variant nature of learners and learning suggest the need for differentiated instructional formats that allow teachers greater control over what, how, when, why, and where they will learn (Robb, 2000). Staff development facilitators must skillfully identify and support the learning needs of adult learners by: (a) drawing on teachers' body of knowledge; (b) validating the range of teachers' experiences; and (c) systematically observing group dynamics to determine individual strengths, limitations, needs, and interests (Lyons & Pinnell, 2001).

### **Motivation**

Adult motivation is integrally linked to the perceived value and relevance of the learning agenda (Robb, 2000). Staff development goals, school improvement plans, and professional change objectives are best accomplished when teachers understand the underlying rationale and significance (Fullan, 1997). Speck (1996) reports that, "Adults will commit to learning only when the goals and objectives are considered realistic and important



to them. Application in the 'real world' is important and relevant to the adult learner's personal and professional needs" (p. 36). In aligning theory directly to purpose, teachers are better able to move beyond simplistic formulas and cookie-cutter strategies towards a deeper understanding of complex situations and pragmatic solutions (Darling-Hammond, 1998; Lyons & Pinnell, 2001).

Motivation is further enhanced when teachers have control over the form and substance of their learning (Boyd, 1993; Costa et al., 1997; Lyons & Pinnell, 2001). Teachers are all too often the unwitting targets of professional development. "Many staff development initiatives take the form of something that is done to teachers rather than with them, still less by them" (Fullan & Hargreaves, 1991, p. 17). Lieberman (1995) reminds us that any and all changes in the functioning of a school, including professional development, are dependent upon teacher participation, teacher desire, and teacher control. Ownership is the key to motivation (Hughes et al., 2002).

### **Active Engagement**

Learning is enhanced when teachers can apply new strategies and concepts directly to their classroom practice (Darling-Hammond, 1998). Boyd (1993) suggests that concrete links between prior knowledge, need, and application are dependent on opportunities for teachers to develop materials, lesson plans, and methods. "Adult learners need direct, concrete experiences in which they can apply the learning to their real work. [They] need to see that the professional development learning and their day-to-day activities and problems are related and relevant" (Speck, 1996, p. 36).

Adult learning is promoted when participants have opportunities to become actively engaged through strategies such as: simulations, role-playing, skill-practice exercises, and by observing expert teachers (Boyd, 1993; Darling-Hammond, 1997). Garet et al. (2001) acknowledge the critical role of observation in promoting learner engagement:

One element of active learning is the opportunity for teachers to observe expert teachers, be observed teaching in their own classroom, and obtain feedback. These opportunities can take a variety of forms, including providing feedback on videotaped lessons, having teachers visit each others' classrooms to observe lessons, and having activity leaders, lead teachers, mentors, and coaches observe classroom teachers and engage in reflective discussions about the goals of a lesson, the tasks employed, teaching strategies, and student learning (p. 925).

Such dynamic learning opportunities allow adults to move surface understandings toward application, analysis, synthesis, and evaluation (Lyons & Pinnell, 2001; Speck, 1996). Darling-Hammond and McLaughlin (1995) sum up the need for interactive learning: “Teachers learn by doing, reading, and reflecting – just as students do” (p. 598).

### **Social Learning**

“True learning requires social support” (Lyons & Pinnell, 2001, p. 57). Professional development structures, thus, should include repeated opportunities for: collaborative research and inquiry; collegial processes for observing and debriefing, thinking and discussion, trying and testing; and for talking about and evaluating the results of teaching and learning (Boyd, 1993; Costa et al., 1997; Darling-Hammond, 1998). A culture of social support is particularly vital to teachers who work in environments that are steeped in traditions of isolationism and territorialism (Fullan & Hargreaves, 1991). Lyons and Pinnell (2001) report, “Where collegiality among members of the group are strong, communities of learners and practice grow. Where it is weak, the community falters” (p. 6).

Attending to the social-emotional growth of teachers may be as important as strengthening their technical competencies, (Boyd, 1992; Costa et al., 1997). Speck (1996) elaborates, “Adult learning has ego involved. Professional development must be structured to provide support from peers and to reduce the fear of judgment during learning activities” (p. 37). Lyons and Pinnell (2001) add that the social foundation of teacher learning is enhanced when: (a) an atmosphere of trust has been established; (b) it is clear that everyone is learning and no one is expected to be perfect; (c) the group shares a common vision for student achievement; (d) group members make a mutual commitment to ask for, receive, and at upon feedback, (e) challenge and professional reflection are shared expectations; and (f) teachers in the group are actively listening and talking to one another in addition to the facilitator. According to Schmoker (1996), “Teamwork is perhaps the most effective form of staff development” (p. 12).

### **Summary**

The professional literature includes discussions of how and why adults learn within four essential strands: prior knowledge, motivation, active engagement, and social learning. These comprehensive categories allow for both broad and specific insights into the

application of adult learning principles within professional development processes for teachers. Another schema for understanding learning as a dynamic process is presented by Cambourne (1988) and Robb (2000). Cambourne's conditions for learning were originally cast with reference to the ways in which young children acquire language yet, as Robb makes clear; this work is integral to an analysis of adult learning. While there are motivation, active engagement, and social learning, the conditions for learning suggest some interesting points of departure, important elaborations, and a provocative lens through which to more fully consider the needs of adult learners.

### **THE ROLE OF CONDITIONS FOR LEARNING IN PROFESSIONAL DEVELOPMENT**

Cambourne (1995) conceptualized a set of eight social-environmental conditions that promote natural language acquisition for young children: immersion, demonstration, engagement, expectation, responsibility, use, approximation, and response. Cambourne recognized the interdependence and recursive nature of these conditions noting that all must be present and in balance in order for learning to occur. Robb (2000) studied these conditions for learning in order to suggest their relevance to adult learning. A closer examination of Cambourne's conditions serves to augment this analysis of the contexts and processes that support teachers as learners.

#### **Immersion**

Children are immersed directly and indirectly in the language they are expected to learn beginning in their infancy (Cambourne, 1995). This language saturation is presented in contexts that are purposeful, natural, and authentic. Children acquire progressively more sophisticated language competencies as they hear the sounds, rhythms, words, and nuances of language while observing the impact of this language on the behaviors of others.

Robb (2000) suggests that immersion in the language and artifacts of accomplished instruction are a necessary condition for teacher learning. An array of professional books, journal articles, and relevant research must be readily accessible for teachers to support their practice, promote professional dialogue, and to suggest arenas for short and long-term inquiry.

## **Demonstration**

Cambourne (1995) observed that children are regularly inundated with ongoing demonstrations of what spoken language means, does, sounds like, and can be used for. He recognized the criticality of repeated and authentic modeling in the learning lives of children, “These authentic demonstrations are the raw materials of nearly all learning, not only language learning” (Cambourne, 1995, p. 34).

Robb (2000) cites the need for and value of demonstrations of practice within professional development processes as teachers regularly model effective practice for one another through classroom visitations, side-by-side teaching, videotapes of practice, and formal presentations. These demonstrations of practice allow teachers to observe contextualized, authentic exemplars and to establish personal, professional, and pragmatic links of understanding.

## **Engagement**

Demonstration is dependent upon engagement. Children are exposed to a virtual flood of language demonstrations on a daily basis. Yet, many of these demonstrations lie outside a child’s need, experience, or level of receptivity. Cambourne (1995) cites three conditions that must be present for a learner to engage in and benefit from any demonstration.

First, learners must perceive their own capacity to repeat the demonstration. For example, children must envision themselves as potential language users if they are to benefit from demonstrations of and invitations to talk. In extending this concept to adults, Robb (2000) notes that teachers must envision their individual capacity for professional growth if they are to benefit from a demonstration of teaching. They must be able to see themselves within the demonstration.

The second criterion for engagement suggests that learners must be convinced that the demonstration is relevant and important (Cambourne, 1995). Young children learn to utter the word ‘cookie’ because it leads to a desirable result. Adult learning is similarly pragmatic. Teachers will engage in workshops and training sessions only when they have a need for or interest in the demonstrated knowledge, skills, processes, or strategies (Boyd, 1993; Calkins, 2001; Speck, 1996).

Finally, Cambourne (1995) contends that learners, young and old, must feel physically and emotionally safe in order to learn from a demonstration. Learning implies an array of risks including misunderstanding, partial success, and failure. Both children and adults require a safe emotional and physical environment that minimizes or eliminates the stigma of disagreeable consequences (Robb, 2000).

### **Expectation**

“Expectations are subtle and powerful coercers of behaviors” (Cambourne, 1995, p. 35). Expectations are conveyed through the words and actions of the adults and peers who interact directly and indirectly with children. Parents and caregivers universally set unambiguous expectations that young children can and will learn to talk. In the arena of professional development, Robb (2000) suggests that teachers’ sense of potential and motivation is facilitated when value is placed on the individual and collective expectation that they will successfully acquire, use, and benefit from the learning.

### **Responsibility**

Cambourne (1995) notes that children learn best and most naturally when they make decisions about when, what, and how to learn. Young children assume full responsibility for trying out words, combining words into phrases, and deciding which conventions to attend to as they learn to talk. Parents and caregivers typically do not structure language learning into discrete, sequential, or planned units of study. Rather, they continually provide the language-rich demonstrations and appropriate expectations that become the child’s impetus for self-directed action. The child assumes responsibility for selecting, interpreting, and integrating language demonstrations into practice.

Teachers, too, need to feel empowered to either control or share the responsibility for negotiating their learning agenda (Robb, 2000). In assigning teachers a more active role in the content, pace, and processes of learning, professional development forums have the potential to yield a climate that is conducive to and respectful of the learning process.

### **Use**

Learning is an active process. Children need time and opportunity to practice, use, and refine their new knowledge in realistic and natural ways (Cambourne, 1995). Adult

learning is also contingent upon use. Teachers need to use, practice, and analyze strategies within their specific instructional context and for their own, unique purposes (Calkins, 2001; Lyons & Pinnell, 2001; Robb, 2000). This focus on use implies something more than role-playing and simulations. It suggests a professional development context that models the rigorous cognitive processes that teachers will need in order to meet the challenges and expectations of a standards-driven system (Darling-Hammond, 1996).

### **Approximation**

Mistakes are a necessary and expected part of the learning process (Calkins, 2001). Children are not expected to wait until they have a fully developed understanding of the language system before they are allowed to talk. Rather, they are expected to mispronounce words, confuse syntax, and experiment with word combinations as part of the natural learning process. Children's approximations of language are most often well received and considered legitimate (Cambourne, 1995).

Adults, too, initially approximate the knowledge, skills, and behaviors of new learning. Strategies introduced during professional development will not always work during the initial phases of implementation. Professional development designers and facilitators should anticipate teachers' approximations by providing the context and format for giving and receiving feedback designed to validate early attempts and promote increasingly more sophisticated practice over time (Robb, 2000).

### **Response**

Cambourne's (1995) final condition for natural language learning honors the need for and value of ongoing response. For young children learning to talk, response moments have certain necessary characteristics: (a) response is a by-product of authentic and purposeful language exchanges; (b) response is related to the meaning of the child's talk rather than the accuracy or form of that talk; (c) response is non-evaluative and non-threatening; and (d) response takes the form of an immediate demonstration of what the child attempted to say. These interactions with a more knowledgeable learner help children refine their understanding and use of language.

Adult learners are similarly dependent upon formal and informal feedback structures that validate the use of a skill or strategy, clarify new ideas, and that provide timely support

and suggestions for refinement (Robb, 2000). Lyons (2002) suggests that while response for adults can assume various forms including constructive feedback, critical dialogue, and formal evaluation, the intent of feedback should be to validate and refine the learner's knowledge and application.

### **Summary**

Traditional professional development processes have largely ignored or underestimated how and why adults learn by failing to acknowledge variations in teachers' prior knowledge, experience, beliefs, needs, or challenges (Robb, 2000). One-day teacher workshops do not yield sustainable motivation, authentic ownership, or a shared sense of purpose. Large group settings serve to promote didactic models of direct teaching rather than hands-on, activity-based processes that compel learners' engagement. Episodic trainings in which an educational consultant blows in, blows up, and then blows out of town cannot build or monitor networks of professional support that nourish and propel learning as a social process. While the principles of and conditions for adult learning may be difficult to measure, objectify, or standardize, the absence of these criteria is palpable for learners.

### **CHARACTERISTICS OF EFFECTIVE PROFESSIONAL DEVELOPMENT**

Theory often precedes practice. While much professional development continues to involve isolated workshops, some compelling concepts about improved practice are beginning to emerge. Educational theorists envision teacher learning as a career-long, inquiry-based, collegial endeavor that is integral to and indistinguishable from the work of schools (Darling-Hammond & McLaughlin, 1995; Renyi, 1996; Robb, 2000; Sparks, 1997; Sykes, 1996). Such school-based and classroom-based learning venues will involve strategies and mechanisms that are long-range, responsive to issues of collaboration and collegiality for faculties and staffs, and that are unique to the context and culture of individual school sites (Costa et al., 1997; Darling-Hammond, 1998; Garet et al., 2001; LaPlant, 1997; Lieberman, 1995; Lyons & Pinnell, 2001; Speck & Knipe, 2001; Sykes, 1996; Thompson, 1997). This vision of teacher learning suggests a set of essential characteristics descriptive of restructured professional development practices: purpose, context, process, duration, coherence, participatory leadership, and standards for staff development.

## Purpose

The explicit goal for all professional development should be to improve teacher performance and student achievement (Alvarado, 1998; Arbuckle, 1997; Darling-Hammond, 1997; Garet et al., 2001; Joyce & Showers, 2002; Lieberman & Miller, 1999; Lyons & Pinnell, 2001; NFIE, 2000; NSCD, 2001; Sparks, 2002; Sykes, 1996; Thompson, 1997). This objective is simultaneously simple and complex. In order to support teachers in improving their practice, professional development must be connected to and derived from the conceptual framework of student content standards. That seems straightforward enough. The complexity of this task lies in the great diversity descriptive of students' social, emotional, cognitive, linguistic, and physical experiences (Ed-Data, 2001). To assure student success relative to academic content standards, teachers will need to know more about their subject matter and more about their students than ever before (Lieberman & Miller, 2000).

Teachers' content knowledge will play a pivotal role in ensuring that students meet or exceed content standards (Arbuckle, 1997; Birman et al., 2000; Darling-Hammond, 1998; LaPlant, 1997; Lyons & Pinnell, 2001; Renyi, 1996). Content expertise involves much more, however, than merely knowing the facts and traditions of an academic domain.

“Teachers in command of their subject understand its substance (factual information as well as its central organizing concepts) and the way in which new knowledge is created, including the forms of creative investigations that characterize the work of scholars and artists” (Schenk & Tyser, 1997, p. 118).

Content knowledge is key to learning what to teach and pedagogical content knowledge is key to learning how to teach subject matter; yet knowledge of children, their ideas, their ways of thinking is crucial to teaching for understanding (Lieberman & Miller, 2000).

While it is easy to suggest that all students will meet or exceed agreed upon standards of achievement, this is clearly not an easy task. Students defy standardization in complex and confounding ways (Darling-Hammond & McLaughlin, 1995). Students learn in different ways, at different rates, and for different reasons. An explicit focus on student achievement suggests a fundamental change in the way teachers think and work.

“When teachers direct their attention away from the technology of teaching and toward the construction of learning, they approach their change in a very different way. They situate student work at the center of the educational enterprise, and they



craft learning opportunities that respond to particular contexts” (Lieberman & Miller, 2000, p. 6).

An explicit focus on improved instructional practice and student achievements has provocative implications for teachers and teaching. Teachers will need to develop new ways of doing business, of viewing themselves, their profession, and their students. Professional development forums need to respond to these new ways of working by providing teachers with enhanced understandings of learners, learning, content, curricula, and pedagogy (Darling-Hammond & McLaughlin, 1995; Lieberman & Miller, 2000; Renyi, 1996).

### **Context**

Just as students display different learning profiles, so do individual teachers, staffs, schools, and school districts. Effective professional development must be responsive to the content of the curriculum, the context of the classroom, and the broader culture of the school (Renyi, 1996). Lieberman (1995) advocates that schools and school systems transition away from commercially produced workshops to job-embedded professional development formats. Darling-Hammond and McLaughlin (1995) concur:

“Detailed solutions imported from afar or mandated from above will predictably disappoint; effective practices evolve from and respond to specific instructional settings. The situation-specific nature of the kind of teaching and learning envisioned by reformers is the key challenge for teachers’ professional development” (p. 603).

The National Staff Development Council (2001) promotes a job-embedded approach to professional development. For teachers, going to school must be as much about their learning as it is about their teaching. They must have time each day to learn, plan lessons, and examine student work as members of learning teams (Garet et al., 2001). Staff development cannot be something educators do only on specified days in the school calendar. It must be part of every educator’s daily work schedule (Joyce & Showers, 2002; Killion, 2000b). Renyi (1996) agrees: “To improve student achievement, public schools must weave continuous learning for teachers into the fabric of the teaching job” (p.1).

Garet, Porter, Desimone, Birman, and Yoon (2001) Garet et al. (2001) note a number of advantages in bringing professional development directly to the school site. Teachers who work together are likely to: (a) share common goals, curricula, assessments, and schedules; (b) take advantage of professional development opportunities to discuss those concepts,

skills, and problems that are relevant to their needs and the needs of their students; and (c) analyze student's needs across classes and grade levels. Joyce and Showers (2002) expand on the advantages of context-specific professional development in noting that teachers from the same school who study together around a shared goal can contribute to a culture of inquiry in which the school becomes the unit of change.

### **Process**

Gone are the days of "sit-and-get" workshops. Educational theorists recommend that the processes of reformed professional development center around and resemble the authentic activities of teaching and learning (Darling-Hammond, 1998; Lyons & Pinnell, 2001). Professional development processes should be experiential, engaging participants in concrete tasks of assessment, inquiry, observation, and reflection that elucidate and enhance teachers' knowledge and beliefs about content, pedagogy, and learners (Sykes, 1996).

Processes of sustained professional study may include a range of job-embedded practices: study groups, observations of practice, case studies, classroom-based action research, professional dialogue, reflective feedback, in-class coaching, and collective problem-solving (Darling-Hammond, 1998; Sagor, 1992; Schmoker, 1996; Sparks, 1999). Robb (2000) offers the following insight into the value of reconceptualizing professional development as an ongoing process of inquiry:

You might wonder why I use the phrase professional study instead of staff development. Teachers who engage in professional study expand their knowledge of teaching practices and how children learn by integrating reading, reflecting, and collaborating into school life. Staff development, the foil to professional study, is often present as one experience in time when an authority on a topic crams information into teachers' minds with little to no knowledge of the school's culture and varied needs. Such presentations deter inquiry because one-time staff development programs do not respond to teachers' questions, nor do they provide the follow-up necessary to create change (p. 2).

### **Duration**

Learning is not an event: it is a process during which participants reinvent, reorganize, and construct knowledge. A preponderance of the recent literature on teacher learning calls for professional development processes that are sustained over time (Darling-Hammond & McLaughlin, 1995; Garet et al., 2001; Pinnell, 2002; Thompson, 1997; Wold, 2002). Internalizing new practices and behaviors is a complex process that cannot be

conducted in haste. Thompson (1997) suggests that while superficial behaviors or practices can be changed quickly, significant improvement that leads to systematic change is the result of focused, long-term efforts. Protracted professional development formats allow teachers opportunities for in-depth discussions of content, pedagogical strategies, and student learning. A culture of continuous learning is dependent upon the availability of ongoing opportunities and sufficient time to observe, think about, discuss, practice, and refine new practices collaboratively and individually (Darling-Hammond & McLaughlin, 1995; Garet, et al., 2001; Lieberman, 1995; Robb, 2000).

Lieberman (1995) emphasizes that continuous learning is contingent upon, “creating a culture of inquiry wherein professional learning is expected, sought after, and an ongoing part of teaching and school life” (p. 593). Improved instruction is dependent upon a lifetime of study and a workplace that supports continuous learning as an integral part of the daily, weekly, and yearlong job (Darling-Hammond & McLaughlin, 1995).

“When we perceive improvement as a goal or an event, our efforts are devoted to finding the one best choice, a choice that does not exist. When improvement is seen as a way of life, learning is continuous and progress is success. The greatest pitfall on our path is the illusion that a ‘solution’ awaits us at the end of the journey. In fact, the journey to excellence is never-ending” (Thompson, 1997, p. 25).

### **Coherence**

Lasting change is promoted when professional study is situated within a coherent, thoughtful, well-organized learning design that is connected to and derived from teachers’ work with students (Joyce & Showers, 2002; Lyons & Pinnell, 2001). A professional development session is most likely to be effective in improving teachers’ instructional practice if it is clearly situated within a broader set of synchronous opportunities for teacher learning and development that builds on earlier learning and professional development planning models are provided to illustrate these design features.

### **Participatory Leadership**

Increased attention to professional development brings with it an emerging consensus about the need for participant-driven processes. To move away from a model of external workshops, which may be unrelated to the needs and culture of individual schools, toward learning opportunities that are intrinsic to the work of improving school, Lieberman (1995)

advises that professional development be designed, implemented, and evaluated by teachers. Boyd (1993) agrees: “The dominant theme in staff development literature is that programs for teachers should be developed by teachers” (p. 6). A participant-driven model is dependent on teachers to make individual and collective decisions about the substance, process, and organizational support for learning in schools (Lieberman & Miller, 1999; Robb, 2000).

Participant-driven professional development does not preclude the use of educational consultants or subject matter experts. In fact, participatory professional development may be dependent on establishing strategic links to a larger learning community with the capacity to contribute expertise and ideas that compliment and enhance the site work (Fullan, 1997; Killion, 2000a; Renyi, 1996; Rogers & Pinnell, 2002). This extended learning and collaborative community provides opportunities for an exchange of knowledge among educators and a focus on teachers’ communities of practice (Lyons & Pinnell, 2001).

“If teacher learning takes place within the context of a professional community that is nurtured and developed both within and outside the school then the effects may be more than just an expanded conception of teachers’ development. Indeed, such teacher learning can bring about significant and lasting school change” (Lieberman, 1995, p. 596).

### **Standards for Professional Development**

Any discussion of improved professional development for teachers would be incomplete without explicit reference to the Standards for Staff Development developed by the National Staff Development Council (NSDC, 2002). These standards are intended to act as guideposts for schools and school districts as they begin the arduous but necessary process of recasting professional development to result in higher levels of learning for teachers and students (Mizell, 2001).

The Standards for Staff Development are the product of extensive research, discussion, and debate by a select task force including representatives from more than 15 nationally recognized professional associations. These educators concluded that to improve the quality and results of public education it is necessary to push the boundaries of normative staff development (Hirsh, 2001). This new vision requires that staff development be results-driven, standards-based, and job-embedded.

The NSDC standards are organized into three overarching strands: context standards, process standards, and content standards. Context standards focus on the site of

implementation: the organization, school, and community. This set of standards poses a vision of professional development that is dependent on collaborative professional learning, administrative leadership, and the alignment of district and school goals for student learning (Joyce & Showers, 2002). Process standards are directed toward how the system organizes learning opportunities to provide teachers with the knowledge, skills and dispositions to maximally affect student learning. These processes are envisioned as data-driven, research-based, and collaborative. Content standards address what educators must understand and be able to do to assure that all students learn successfully.

The shifts in practice described in the Standards for Staff Development are significant and powerful (Sparks, 1997). This new vision portends professional development forums and processes with the capacity to influence the knowledge, attitudes, and practice of individual teachers, administrators, and entire faculties and have the potential to alter the cultures and structures of the organizations in which those individuals work (Sparks & Hirsh, 1997). It is a grand vision of what may lie ahead.

## **Professional Development Models**

### **PRLIM MODEL**

Thompson (1997) offers a professional development model that has shown to be successful in planning for site-based school improvement. The Readiness, Planning, Learning, Implementation, Maintenance (RPLIM) model was synthesized from the literature on organizational development, adult learning, school change, leadership behavior, and staff development. This systematic approach includes five stages for facilitating site-based improvement.

The first stage involves a careful assessment of the climate, skills, relationships, and values of the school. This needs assessment is followed by more specific planning during which the vision for improvement becomes focused and specific practices or innovations are identified for study. In the third stage, participants learn new skills, knowledge, roles, and behaviors suggested by and necessary to the planned innovation. The fourth stage involves the actual implementation of the innovation. A variety of supports are available during this phase including: inter-school visitations, coaching, peer observation cycles, and access to

support materials and resources. The final phase, maintenance and monitoring, is designed to nurture, promote, and monitor the innovation.

### **THE LEARNING SPIRAL**

Lyons and Pinnell (2001) offer a conceptual framework that serves to further clarify the need for and vision of a coherent professional development plan. The learning spiral proceeds from “specific how-to-do-it direction to the kind of sophisticated analysis and reflection required to perform an instructional procedure or approach powerfully and efficiently” (Lyons & Pinnell, 2001, p. 13). Ten sequential stages are defined within a spiraling, recursive process that can be used both in professional development sessions and in-class coaching contexts:

1. Assessing the Context, the initial stage in the learning spiral, involves the thoughtful analyses of student achievement, teacher practice, and school culture.
2. Providing the Basics assures that teachers have the necessary instructional materials and a clear understanding of how to organize and apply these materials in service of the instructional innovation.
7. Demonstrating the Process involves explicit examples of the instructional innovation. These demonstrations may include videotapes of exemplary practice or observations of teachers or coaches who are using the instructional innovation successfully.
8. Establishing the Rationale provides the theoretical framework that supports the studied innovation.
9. Engaging the Learners is intended to help teachers visualize the approach through interactive contexts such as discussions of professional literature, examinations of practice, and analyses of student work.
10. During the Trying It Out stage, teachers use, analyze, and share the results of the studied innovations.
11. Establishing Routines and Procedures provides focused time to refine and polish sets of teaching behaviors related to the instructional approach.
12. Coaching for Shifts in Behavior is designed to afford teachers structured opportunities to analyze practice by studying the impact of instruction on student learning.
13. Coaching for Reflection supports teachers in the ongoing analysis and reflection of instructional practice.
14. The final stage, Extending Learning, provides the opportunity and structure for teachers to generalize their learning to new arenas for application and study.

## STAGES OF IMPLEMENTATION

Judith Sandholtz is known for her work in the evolution of technology use within classrooms. Sandholtz, along with Ringstaff and Dwyer authored a book about the gradual alteration of technology-rich classrooms from teacher-centered to student-centered. As technology took hold in classrooms, students began playing a more active role in their own learning. Meanwhile, teachers gave up their position as "sage on the stage" to become coaches or facilitators, and seen as the "guide on the side" (Sandholtz, Ringstaff, & Dwyer, 1997). Through their work with *Apple Classrooms of Tomorrow*, the authors noted five stages teachers progressed through as they employed technology within the classroom. These include:

- The entry stage - teachers become accustomed to a transformed classroom as computers and other technologies are placed in the classroom. Teachers find themselves dealing with discipline problems, resource management issues, organization, and some personal frustration. Familiar tools such as the chalkboard, textbooks, workbooks, and handouts are still relied upon.
- The adoption stage - teachers become less concerned about how to connect the computers and more concerned about how to use them in the instructional curriculum. Technology is used to support traditional teaching methods such as drill and practice, text orientation, whole-group lectures, and seatwork.
- The adaptation stage - the technology becomes seamlessly integrated into traditional classroom practice. Traditional pedagogy still dominates but is supplemented 30-40% of the time with the use of word processors, databases, graphics, and computer-assisted instruction. The increased productivity resulting from the use of software tools allows time for the curriculum to be enhanced by additional exploratory activities using the technology.
- The appropriation stage - teachers achieve greater personal mastery and confidence with the technology and their roles begin to shift into using new, innovative instructional strategies. Team teaching, interdisciplinary project-based instruction, and individually paced instruction become common practice. Teachers begin to reflect on their teaching practices, to question old patterns, and to speculate about the causes behind the changes

they are witnessing in their students. Students are engaged in collaborative learning activities involving interdisciplinary projects.

- The final stage of the model is the invention stage. Teachers demonstrate a willingness to experiment with a variety of instructional approaches. Teachers view learning as a more active, creative, and socially interactive process than before. A constructivist perspective develops and teachers assume new roles in the classroom. In addition, alternative methods of assessment, such as portfolios of student work, are combined with traditional methods of evaluation.

### Summary

Professional development for teachers cannot be standardized into a lock-step sequence of events or processes. Support strategies that make a difference for teachers and students must be responsive to the specific strengths, needs, and contexts of participants. Yet, process strategies such as the RPLIM model, the Learning Spiral and Sandholtz' Stages of Implementation can be used to guide and facilitate a coherent approach to change. The value of any such planning model lies in its capacity to provide a structure and process for sustained professional study (Garet et al., 2001).

Changing the concept of professional development to meet the expectations and promise of student academic content standards will be dependent on significant changes in purpose, context, process, duration, coherence, and participatory leadership. "These 'deep changes' demand not only the acquisition of new knowledge and skills on the part of educators but 'transformative learning' that affects their beliefs and assumptions about learning, teaching, and leadership" (Sparks, 2002, p. 2-1). Educational theorists have suggested that a new vision/model for professional development must be directed at student learning, embedded within the context of practice, realized through sustained inquiry, and directed by and for teachers (Arbuckle, 1997; Boyd, 1993; Darling-Hammond, 1998; Darling-Hammond & McLaughlin, 1995; Lieberman, 1995; Lieberman & Miller, 1999; Lyons & Pinnell, 2001; Renyi, 1996; Robb, 2000; Sykes, 1996). While these criteria appear both sensible and admirable they beg the question: What does a new vision of professional development for teachers look like in practice?



## ASSESSMENT OF PROFESSIONAL DEVELOPMENT

Of the many models established and evolving, which is better? Why? And, what would we use as evidence to support this analysis? What follows is a discussion of general assessment strategies.

Renyi (1996) suggests that the goal of any professional development process should be the observable evidence of changed or changing classroom practices that impact student achievement. This emphasis on student achievement is key. Professional development processes should lead directly to improved student learning as evidenced through student learning artifacts and a variety of test results (Lyons & Pinnell, 2001). Yet this direct correlation is difficult to establish for at least two reasons: time and complexity.

Lyons and Pinnell (2001) suggest that it, "... can take several years of professional development to create powerful instruction" (p. 54). Impatient politicians and administrators may be reluctant to allow sufficient time for professional development to impact student achievement expecting, instead, instant and dramatic results. Add to this 'quick fix' mentality the complexities suggested by student mobility, individual teacher capacity, changing leadership, competing educational-political agendas, and institutional inertia, and the difficulties of assessing professional development structures increase exponentially.

In the absence of formal assessment processes that can clearly juxtapose student achievement with professional development, the field relies on informal assessments of the process itself. Birman, Desimone, Porter, & Garet (2000) surveyed more than 1,000 teachers who had participated in a teacher-training project sponsored, in part, by the Eisenhower Professional Development Program. This Title II program of the Elementary and Secondary Education Act was funded at \$335 million in 1999 and was designed to support teachers in the implementation of math and science curricula. Surveys were designed to offer teachers the opportunity to share their perceptions of the professional development process.

Birman et al. (2000) also conducted six exploratory case studies and ten in-depth case studies across five states. When all was said and done the researchers noted three structural features that appear to set a successful context for professional development: form, participation, and content.

Birman et al. (2000) note that the studied reform activities, including teacher networks, mentoring relationships, study groups, and teacher resource centers appear more

effective than traditional, external professional development processes. The researchers caution, however, that these results may be somewhat confounded by issues of duration. The examined reform activities took place over longer periods of time allowing opportunities for more intensive content foci, active learning experiences, and training coherence.

Interestingly, when traditional forms of professional development such as workshops and conferences are sustained over longer periods of time, they appear to be just as effective as the reform structures suggesting that it is, “The characteristics of the activities not the form that matter” (p. 29).

A series of advantages related to collective participation was cited by Birman et al. (2000): (a) it enables teachers to discuss concepts and problems that arise during the professional development; (b) it provides teachers with opportunities to integrate what they learn with other aspects of their instructional content since their colleagues are likely to share common materials, requirements, and goals; and (c) it may contribute to a shared professional culture as teachers develop common understandings of instructional goals, methods, problems, and solutions. The researchers further note that collective participation allows for more active learning formats (e.g., observations, writing, and videotaping) that result in the increased knowledge and skills of participants.

Finally, the evaluative work of Birman et al. (2000) suggests that content focus has more impact on participant satisfaction than grouping, learning environment, or support in planning. The results imply that content must be designed as a coherent, integrated program of teacher learning; aligned with standards, assessment, and the real work of teachers; responsive to teachers’ prior learning; and supportive of teachers’ next steps.

Garet et al. (2001) conducted a large-scale, empirical comparison of the effects of different characteristics of professional development on teachers’ learning. The researchers surveyed a nationally representative sample of teachers who had attended a variety of Eisenhower-assisted professional development programs over a six-month time frame. While the Eisenhower program provides funding for professional development for teachers, it does not advocate or promote a specific approach to professional development. Rather, this program supports a variety of forms and processes including: workshops, conferences, study groups, professional networks, collaboratives, task force work, and peer coaching. It is also important to note that Eisenhower programs are frequently subsidized through additional

federal, state, and local funding sources. The results of this study, thus, are broadly generalizable across settings, contexts, and structures.

Within the large-scale study conducted by Garet et al. (2002) three core features of professional development processes were described that appear to have a positive impact on teachers' self-reported change in knowledge, skills, and instructional practice: (a) a focus on content knowledge; (b) active learning processes; and (c) coherence with previous learning, reform initiatives, and the day-to-day work of teachers. It is through these core features that the following structural features appear to impact teacher learning: (a) the duration of the professional development activity; (b) collective participation of teachers; and (c) the form of the activity.

The standards-based reform initiative places considerable emphasis on subject matter expertise: Teachers must know the subjects they teach and understand how students learn these subjects. The results of the Eisenhower study clearly position content knowledge as a central consideration: "Much of the literature on professional development focuses on the process and delivery system; our results give renewed emphasis to the profound importance of subject-matter focus in designing high-quality professional development" (Garet et al., 2001, p. 936). Content knowledge provides the conceptual focus through which teachers can engage in active, 'hands-on' learning; it provides a coherent link between what teachers know and what they need to know to do their work effectively, and; a clear, rigorous focus on subject matter appears to produce an enhanced understanding of content knowledge and skills.

The work of Garet et al. (2001) further indicates that sustained and intensive professional development is more likely to have an impact on teacher practice than are shorter, more episodic professional development formats. Interestingly, duration appears to trump the distinction between traditional and reformed formats of professional development:

"Traditional and reform activities of the same duration tend to have the same effect on reported outcomes. Thus, to improve professional development, it is more important to focus on the duration, collective participation, and the core features (i.e., content, active learning, and coherence) than type" (Garet et al., 2001, p. 936).

In other words, a traditional workshop format may have a positive impact on teachers' instructional practice if it is designed to engage connected groups of teachers over

time through engaging processes that resemble authentic and meaningful teaching and learning processes.

Garet et al. (2001) also note the importance of a coherent design and collective participation. Professional development emphases and processes that are strategically linked to teachers' prior experiences, aligned with standards and adopted reform initiatives, and which support professional communication among and between teachers appear to support positive change in instructional practice. The data provides empirical support that the collective participation of groups of teachers from the same school, subject, or grade-level is related both to coherence and active learning. Teachers reported the importance of attending professional development sessions with colleagues who experience similar needs and working contexts. For example, a team of five kindergarten and links with their classroom work and are better able to sustain the study through site-based dialogue, collaboration, and resource sharing.

While these results confirm some important concepts about high-quality professional development design, Garet et al. (2001) acknowledge the need for additional, longitudinal research that is focused directly on the, "relationships among professional development, teacher learning, teacher change, and ultimately, student learning" (p. 967). Lists of characteristics, such as those generated through this research project, commonly appear in the literature on effective professional development, yet there is little direct evidence on the extent to which these characteristics relate to positive outcomes for teachers and students.

"Research studies are needed to determine the efficacy of various types of professional development activities, including pre-service and in-service seminars, workshops, and summer institutes. Studies should include professional development activities that are extended over time and across broad teacher learning communities in order to identify the processes and mechanisms that contribute to the development of teachers' learning communities" (Bransford, Brow & Cocking, 1999, p. 240).

## CONCLUSIONS

Theorists and practitioners largely agree that professional development is a critical issue. Sykes (1996) asserts that, "Teacher learning must be at the heart of any effort to reform education as better teaching ultimately relies on better teachers" (p. 465). Educators further agree that professional study is a career-long effort: "There are no instant remedies" (Robb, 2000, p. 9). Teachers need time to: study learning and learners; reflect on and refine teaching;

effectively analyze student work as the central axis for professional discourse and disciplined inquiry; build ownership; and establish purposeful learning networks designed to improve individual and collective instructional programs (Darling-Hammond & McLaughlin, 1995). There is a growing recognition that change cannot be imposed from the outside. Meaningful reform is dependent on a comprehensive design that embeds professional development within the context of schools and classrooms (Lyons & Pinnell, 2001). Finally, it is becoming increasingly clear that the voices of teachers must compel any successful reform in order to create a culture in which professional learning is expected, sought, valued, and institutionalized (Darling-Hammond, 1997; Lieberman & Miller, 1999).

Professional development for teachers is an arena ripe for investigation and experimentation, one with the potential to catapult teaching to a truly professional level. This review of the literature has revealed a clear need for teacher training processes that reflect the authentic setting, tasks, and expectations of teaching and learning. Within all of the models researched here, there are factors worth investigating further, especially in light of integrating technology within the curriculum.

## CHAPTER 3

### METHODOLOGY

The purpose of this case study is to investigate the impact of an innovative approach to technology professional development, in a small, suburban school district, in order to consider its potential to support teacher learning specifically focused on the use of technology for literacy teaching. Two research questions served as the foundation of this study investigating a successful approach to technology professional development and each had sub-questions for deeper investigational:

#### QUESTION ONE

What are the components of the technology professional development used in this district?

#### Sub-Questions

1. What was the content of the technology professional development program?
2. What structures, or formats, were used within the technology professional development program and within each session?
3. How was the technology professional development program facilitated?
4. What changes in resources occurred for and within the technology professional development program?

#### QUESTION TWO

How do teachers perceive their ability to use technology and apply it in their teaching in order to promote student literacy learning?

#### Sub-Questions

1. What differences were noted in the teacher's ability to use technology, both professionally and with students in the classroom?
2. What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?
3. What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program?

4. What differences were noted in the characteristics of collegiality and/or collaboration between teachers?

The first step in data collection was the informal interviews conducted with district administrators and the classroom visits by the researcher in order to build the background information that frames the data collection and analysis phases. According to Creswell (1998, p. 153), a case study begins with a description of the case and setting. These interviews included the superintendent - for overall vision and history of the district, the Information Services Director – for the history of technology hardware and software in the district, and the Project Director – for the history of the professional development program in the district.

After interviews with district administrators, a survey given over the Internet provided foundational, quantitative data that were analyzed, synthesized, and prioritized to discern participants' perceptions and overall assessment of their ability to integrate new technology knowledge. The initial analysis of the survey data provided broad and tentative answers to the research questions and was essential for informing the content of both the site administrator and the focus group interviews. The site administrator interview data provided additional details and prompted new questions that were subsequently explored in the focus group interviews. This chapter addresses the methods used to complete this investigation.

### **METHODOLOGICAL FRAMEWORK**

This study includes both quantitative and qualitative methods. The intent was to first create a pool of quantifiable survey data in order to compare and contrast participants' experiences and then to use these data in focus group interviews to investigate themes and gain insight into the interpretations of the impact of Citrus Heights' technology professional development, specifically as related to the intersection of literacy teaching and technology use.

The theoretical basis for combining qualitative and quantitative methods has been well articulated. Patton (1997) reports, "A consensus has emerged in the profession that evaluators need to know and use a variety of methods in order to be responsive to the nuances of particular evaluation questions and the idiosyncrasies of specific stakeholder needs" (p. 267). Although this study is not a program evaluation, Patton's arguments may be extended to this case study as well because it allows the researcher to use qualitative data to

better understand quantitative findings and quantitative data to contextualize qualitative interpretations (Fitz-Gibbon & Morris, 1987).

Neither research methodology is intrinsically better than the other. Quantitative data are precise, clinical, and objective, while qualitative descriptions are detailed, illustrative, and idiosyncratic (Merriam, 1988). The field of educational research “Has come to recognize that the use of multiple methods, both quantitative and qualitative, can be valuable, since each has strengths and one approach can often overcome the weakness of the other” (Patton, 1997, p. 266). Best (1981) supports this thinking:

There is probably too much dependence upon single methods of inquiry. Because each data-gathering procedure or device has its own particular weakness or bias, there is merit in using multiple methods, supplementing one with others to counteract bias and generate more adequate data. (p. 153)

This project uses the case study design because, as Yin (1984) has argued, this methodology is particularly well suited to situations where it is impossible to separate the phenomenon's variables from their context. The factors involved in professional development for teachers as related to the use of technology in literacy teaching are intertwined requiring this case study approach. A body of research literature in instructional technology identifies the need for a qualitative study design to explore this topic in greater depth (Creswell, 1997 and 2002; Patton, 2001; Schonlau, Fricker, Jr., & Elliott, 2001; Yin & Campbell, 2002). In an inductive research design such as case study, the conclusions are discussed in relation to the existing body of literature on this topic. In this project, methodological literature in qualitative case study design was used to frame the methodology and guide the analysis of the data collected. Specifically in this study, observation of classroom practice and interviews with informants were the two qualitative data collection methods employed.

### **DESIGN OF STUDY**

The overall research design of this case study afforded an increasingly detailed inquiry into Citrus Heights' technology professional development experienced by teachers and site administrators. The initial analysis of the survey data provided broad and tentative answers to the research questions and was essential in informing the content of both the site administrator and the focus group interviews. The site administrator interview data offered additional details and prompted new questions that were subsequently explored in the focus group interviews. With all three layers of data in place, it was possible to answer the research



questions. Appendix A illustrates the overall research design structure. The remainder of this chapter outlines the design, participants, setting, and procedures for this research.

The following steps were followed in this research.

1. Selection of research site and gaining entrance via classroom observations and informal interviews with district administrators.
2. Design and pilot testing of the online survey tool.
3. Survey of 3<sup>rd</sup> through 6<sup>th</sup> grade teachers.
4. Preliminary analysis of survey data to inform interview protocols.
5. Interviews with site administrators.
6. Focus group interviews.

The first step involved selecting the research site and gaining permission for contacting the teachers. Citrus Heights was selected because of the national recognition it has garnered for its technology integration, as well as its close proximity to the researcher's hometown. This required interviews with the Superintendent, the Director of Information Services, and the Project Director during which pertinent data regarding the district and the professional development program were collected. The survey was then designed based upon information collected during these unstructured interviews. The researcher also began to establish a relationship with some of the teachers while on classroom visits where additional data were collected.

The second step involved piloting the survey with a group of 2<sup>nd</sup> grade teachers, with a test-retest on a small group in order to achieve reliability of results. The survey was then revised for the larger group of 3<sup>rd</sup> – 6<sup>th</sup> grade teachers. This group of teachers was selected in order to increase the sample size and based upon the technology use within this district as determined by the Project Director.

The next step involved contacting 3<sup>rd</sup>- 6<sup>th</sup> grade teachers via email to seek their participation in the online survey. The email was sent through the district's intranet via the Program Director to all teachers within this grade level grouping. The details, purpose and time commitment expected were all communicated to each teacher (see Appendix B for copy of email). Additionally, teachers were informed, via the initial email, that the data collected would remain confidential and records for this research would exist only in coded form. The teachers who volunteered to complete the survey represented a diverse population relative to years of service and experience within and outside of the district, as well as represented the

four grade-levels included in this study. The survey was accessible online for participant access during the month of May 2005.

The fourth step in this study involved preliminary analysis of survey data in order to finalize the site administrator and focus group interviews. Interview protocols were developed from initial trends drawn from survey responses after these were downloaded into an Excel file (see Appendix C for interview protocols).

Additional data were collected during administrator interviews. All elementary school principals were contacted to participate in a 30-minute interview. All principals volunteered to be interviewed. Information from the site administrator interviews was used to form the interview protocols for teacher focus group interviews. Administrator interviews were later transcribed verbatim by a professional service with respondents' identifying information removed. The researcher verified these transcripts through checks of the recordings and the researcher's notes and then emailed the transcripts to site administrator participants for member checking and validation of information. Validated transcripts were then entered into HyperResearch (Hesse-Biber, Kinder, & Dupuis, 1997), a dynamic database, for analysis of patterns and trends within responses.

The final step in data collection was a series of focus group interviews conducted with a subset of teachers who were self-selected at the end of the online survey. These teachers were representative of the district in years of service, gender, grade level and involvement with the district's technology professional development over the course of the program's six-year history. The focus group interview was conducted at a school site, at a time and place convenient to participants, on May 23, 2005, after the school session. The focus group interview was recorded for later transcription. Following transcription, the researcher compared the transcripts to the recordings and the researcher's notes to verify the data. These transcripts were then emailed back to participants for member checking and validation of information. Validated transcripts were entered into HyperResearch® (Hesse-Biber, Kinder, & Dupuis, 1997), a dynamic database, for analysis of patterns and trends within responses.

Finally, the researcher collected data from the online survey for comparison with site administrator and focus group interview data, to determine relationships. An independent

researcher completed a crosscheck analysis on the identification of broad themes and initial relationships.

## **Data Collection Processes**

### **SELECTION OF SITE AND PARTICIPANTS**

Citrus Heights school district was selected based upon purposive sampling criteria. The district has an award-winning technology program with a comprehensive professional development program that includes site-based follow-up. The district's professional development program has been in place for several years and comes highly recommended by industry experts. This site was selected due to the attempts by this district to meet statewide reform efforts. This district chose an innovative approach to statewide reform efforts to increase student test scores in literacy and mathematics. The school board has leveraged funds, specifically Technology Innovation Challenge Grant (TICG) funds – a federally funded program that supports partnerships among educators and other business/community organizations to develop innovative applications of technology for fully integrating technology into schools - in order to pursue these reform efforts in light of the diminishing funds available within the state of California and throughout the country. The reform grew from grassroots efforts by teachers within the district, building to an effort that includes all members of this community.

### **District Background**

Citrus Heights is a small, urban school district in Southern California. The district is comprised of six elementary schools and two middle schools, serving approximately 4,600 students. This school district serves a diverse student population (additional information can be found in Appendix D) with the following approximate ethnic/cultural breakdown: 37% Hispanic, 30% White, 24% African American, 4% Filipino, 4% Asian, 2% Pacific Islander, 1% American Indian/Alaskan, and 1% Multiple Ethnicities. More than seven languages are spoken within the student population, 18% of the students are designated as English Learners, and 45% of the students are receiving free lunch services with 18% receiving reduced lunch price services. The average class size in third grade is 18.8 students and in fourth and fifth grades the average is 28.28 students. (Within the state of

California, the class size ratio in grades K-3<sup>rd</sup> is 20 students: 1 teacher, which impacts the third grade class size within this study.) The ratio of students to each computer is 2:1, in all classrooms throughout the district. Some third and sixth grade classrooms are currently participating in a program with a 1:1 ratio of students to computers.

### **Participants**

Participants include third through sixth grade teachers and site administrators, all of who are employed in the district. Teacher and administrator participants varied regarding years of experience in teaching and/or administration from beginning to veteran. All subjects participated in the district technology professional development, although to differing degrees - from attending the summer institute and that which is required, to seeking additional support on-site - and/or through opportunities outside those offered by the school district.

### **Instrumentation**

Three inquiry structures were designed to provide an appropriately variegated data pool: participant surveys, district and site administrator interviews, and focus group interviews. A survey (see Appendix E) was administered to document the breadth of experiences and range of reactions of third through sixth grade teachers who participated in this district's technology professional development. This survey provided a foundation of quantitative data that directed and shaped the qualitative interview processes.

The researcher conducted individual interviews with site administrators to yield an administrative perspective on the impact of this district's technology professional development on the instructional practice of participating teachers. Focus group interviews of volunteer teachers followed the site administrator interviews. The researcher conducted a preliminary analysis of the survey data in order to explore identified themes and response patterns to inform the interview protocol. Focal group interviews provided opportunities for substantive conversations during which subsets of the participant pool reflected on the structures, outcomes, and implications of the professional development model.

## PARTICIPANT SURVEY DESIGN

The online survey instrument elicited relevant information on the two research questions. The survey was constructed specifically for participating teachers in third through sixth grades. These grades were selected by the Program Director as a convenience sample of those teachers who have participated in the district-wide professional development program and are representative of both phases of technology upgrades within the district (both 2:1 and 1:1 computing ratios). The survey was crafted through a three-stage developmental process. First, an initial field test of the draft/paper survey was piloted with a representative sampling of second grade teachers, whose technology experience parallels that of upper elementary school teachers and due to the convenience of their accessibility to the researcher. Respondents were urged to indicate phrases or words on their individual survey forms that lacked clarity, add suggestions for revisions, and share questions, confusions, and recommendations during a directed, whole-group debriefing session. This pilot test shaped the overall design, directions, questions, and response modes.

A second iteration of the survey was further refined by a group of graduate students through an involved group interview process during which respondents were asked to “think aloud” as they worked through the entire survey instrument. Subjects were encouraged to reveal their thoughts as they read each question, considered each response option, and selected their answers. This review process was used to refine the specific wording and order of response items to assure user-clarity and accuracy of answers. Finally, members of the researcher’s committee reviewed the third draft instrument for final recommendations and approval.

The principles of good research design noted in the following literature, Frankfort-Nachmias & Nachmias, 1996; Punch, 1998, suggest several characteristics descriptive of a good survey. These criteria were used in the design of the survey instruments:

- *A good survey deals with a significant topic that cannot be obtained from other sources.* In this study, teachers’ perceptions of how they were able to implement what they learned through the professional development process were gathered from their answers in the survey. This is a reflection over the entirety of the reform from the teachers’ perspective and could not have been obtained from other immediate sources.

- *A good survey is as short as possible.* The five-part survey was designed for completion within 10 to 15 minutes, in order to minimize user-burden and maximize the return rate.
- *A good survey is attractive in appearance, neatly arranged, and clearly duplicated.* The final product employed a set of bold boxes used to segment the presentation into five, clearly labeled sections. Font size, color, style and format were all designed for clarity and ease of reading. As an example, question 7 is shown below.

7. Please respond truthfully to the items below by indicating how little or how much you agree with each one on a scale from Strongly Disagree to Strongly Agree.

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
A. I like to teach with technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B. Teaching with technology is fun.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C. I do not feel confident about teaching with technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D. My teaching with technology improves my students' reading and writing skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E. I have learned new tricks and better strategies for teaching with technology this year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F. I have re-assessed how I teach with technology this year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G. I have not changed the way I teach with technology this year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H. I am not confident in talking about teaching with technology with peers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I. I am a leader in teaching with technology in my school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- *A good survey provides directions that are clear and complete.* Shaded boxes were used to delineate each question and text frames contained explicit directions for each section. Question 15 below is an example of this.

15. How often (per week) are your students engaged with educational technology for each of the following purposes? (These are based on ISTE - NETS for Students Profiles)

	Every Day	Frequently	Often	Occasionally	Never
A. Use keyboards and other common input and output devices.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B. Discuss common uses of technology in daily life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C. Discuss basic issues related to responsible use of technology and information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D. Use productivity tools and peripherals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E. Use technology tools (e.g., multimedia authoring, presentation, Web tools, digital cameras, scanners) for individual and collaborative writing, communication, and publishing activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- *A good survey uses questions that are objective with no leading suggestions or biased language.* All questions and response options were phrased in clear, unambiguous language. While the survey instrument included educational jargon, these terms are considered part of the professional lexicon of Citrus Heights and served to add clarity and consistency to the survey language. The following examples, questions 10 and 11, show how the "Other" category was used along with open-ended questions following those questions where response categories were given in order to give respondents the chance to elaborate on their choices and diminish the leading nature of closed-ended questions within the survey.

10. Which factors serve to *support* your implementation of the instructional strategies from the district technology professional development sessions? *Check all that apply*

- A. I have access to the necessary instructional materials at my school.
- B. My principal's instructional emphasis matches the technology professional development.
- C. My grade-level team's instructional emphasis matches the technology professional development.
- D. I have sufficient time to reflect on my instructional practice with technology at school.
- E. I receive appropriate feedback from my principal and/or other resource staff to support my professional growth using technology.
- F. The professional development activities available at my school site support my professional growth using and teaching with technology.
- G. I receive adequate support for the technology I use.
- H. Other (please specify)  
\_\_\_\_\_

11. What has been the most *helpful* in supporting your integration of technology?

- *Questions are presented in good psychological order.* Best (1981) recommends that surveys proceed from general to more specific responses as this order helps respondents organize. In this survey, the questions with short answers were placed near the end of the survey.

18. Please describe 1 or 2 things you've done with technology in your teaching over the past few months.

19. What would you like to do with technology that you are not able to do now? What would you need in order to accomplish this?

20. Please add any additional comments about the district's technology professional development and implementation that you feel are pertinent.

There is a growing body of research written about Internet surveys in the literature, specifically Web and e-mail surveys (Dillman, 2000; Kaye & Johnson, 1999; Paolo, Bonaminio, Gibson, Partridge, & Kallail, 2000; Schonlau, Fricker, Jr., & Elliott, 2001). Most of these researchers compare two conventional survey modes, mail and telephone, with Internet survey modes across the topics of response rate, cost, timeliness, sources of error, and data quality. Response rate in most articles showed a wide variance, although email seemed to be the most popular mode of response (Schonlau, Fricker, Jr., & Elliott, 2001). In this case, the response rate was higher than the average rate in previous studies of 26 – 30%. Of the 63 teachers in grades 3 – 6 who were invited to participate, 28 responded for a total response rate of 44%. The costs associated with conventional methods were found to be higher than cyber methods in most cases (Kaye, & Johnson, 1999). For this research, the costs were minimal and included a membership to an online survey tool for \$19.95 per month of access. The cyber methods had a shorter response time than the traditional method of mail and thus an online survey was chosen for this research (Kaye, & Johnson, 1999) to be completed during a one-semester course of dissertation studies.

Sources of error research is mixed. Even though conventional survey modes provide the ability to reach most of the survey population, getting people to respond is becoming increasingly difficult (for example, caller ID and answering machines are routinely used to screen calls from telephone surveyors and solicitors). The population in this study all had equal access to the Internet via a closed network within the school district. In addition, the participants are well versed in technology for personal and professional uses within this district. Issues around data quality are usually measured by the number of respondents who have, intentionally or unintentionally, missed at least one survey item or by the percentage of missed items on respondents' questionnaires. Of the 28 respondents, 89% were complete, compared to the more common usability rate of 75%.

For open-ended questions, longer answers are usually considered to be more informative and of higher quality. For closed-ended questions, it appears that e-mail surveys may incur a higher percentage of missed items than do postal mail surveys (Paolo, Bonaminio, Gibson, Partridge, & Kallail, 2000). Seven of the twenty questions for this online survey were open-ended to elicit more detailed and informative answers from the participants. And six of the thirteen closed-ended questions on this survey included an



“Other” category for participants to use when the categories given did not meet their needs. These types of questions were used in this online survey to decrease the problem of missed items that email surveys have had historically.

## **PARTICIPANT SURVEY ORGANIZATION**

The survey instrument was organized into five distinct sections: Participant Profile, Technology Confidence, Site Implementation, and Final Comments.

The first section (Participant Profile) was crafted to yield a range of demographic information that would allow the data to illustrate comparability to the district as a whole using a variety of criteria including participants’ teaching experience, experience within the district, and hours of participation in the professional development program.

The second section, Technology Confidence, was created to yield a self-reflection of technology confidence. An interval scale, also known as a Likert scale, (with response choices of: strongly agree, agree, no opinion, disagree and strongly disagree) was devised with a total score between 20-100 for respondents to self-reflect on their own technology uses. These closed-ended questions with ordered, Likert-scale response choices offer a range of available responses (Salant & Dillman, 1994). The elements of each of the 20 line items were drawn from the professional development literature that emphasizes the teacher as the change agent within a classroom (Richardson, 1998), the value in reflection within the learning process (Cambourne, 1988), and the National Educational Technology Standards (NETS) for Teachers (ISTE, 2000). Specific performance indicators were selected to represent the over-arching theme of each of the six technology standards (ISTE, 2000) and aligned with the professional development standards. These statements were then revised for ease of understanding.

In responding to these questions participants selected the single most appropriate response from a structured continuum. For example, “I design learning opportunities that integrate technology in order to support the diverse needs of my students.” Directions state: “Please respond truthfully to the items below by indicating how little or how much you agree with each one on a scale from Strongly Disagree to Strongly Agree.” Closed-ended questions with ordered answer choices tend to be quite specific. Hence, they are less demanding for the respondent and relatively easy for the researcher to code and analyze.

Section three of the survey, Site Implementation, was designed to determine the things that facilitated or impeded the implementation of skills and strategies learned during technology professional development. That is, the two sub-questions to research question two:

- Sub-question 3: What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?
- Sub-question 4: What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program?).

Open-ended questions were included in this section to uncover deeper understandings about the resources available and how they impacted teachers' perceptions regarding their ability to implement new knowledge.

**13. Please describe what you see as the biggest barrier to your technology integration/implementation.**

Partially closed questions within this section allowed participants to select multiple answers from a set of responses.

For example:

**12. Which factors serve to *impede* your implementation of the instructional strategies from the district's technology professional development? Check all that apply.**

- A. I do not have access to the necessary instructional materials at my school.
- B. The instructional strategies from the technology professional development do not match my style of teaching.
- C. My principal supports a different instructional model.
- D. The featured instructional strategies were too advanced for my students or for myself.
- E. The featured instructional strategies were too easy for my students or for myself.
- F. I do not have sufficient time to plan for technology integration and/or implementation.
- G. Required testing and assessments take too much time away from teaching with technology.
- G. My students are academically higher than those shared in the technology professional development.
- H. My students are academically lower than those used in the examples given in the technology professional development.
- I. My students are more diverse than those as examples in the technology professional development.
- J. My students are less diverse than those examples given in the technology professional development.
- K. The technology is not available to me.
- L. Other (please specify)

This question structure, "Please mark all that apply," and, "Other (please specify)," has the advantage of not forcing participants into single responses that may not fit their situation and has the potential to generate unanticipated information.

Section 4 of the survey, Collaboration, asked respondents to reflect on the types of input they perceive they have within the different levels of the professional development program. Again, partially closed questions were selected for this section to allow participants as many selections as possible with an additional choice of "Other" for items not listed allowing respondents opportunities for brief narrative responses.

The final section of the survey instrument, Final Comments, included a small set of open-ended questions. This question structure does not provide any pre-fabricated responses. Rather, respondents have the opportunity to construct narrative responses using their own words.

For example:

**18. Please describe 1 or 2 things you've done with technology in your teaching over the past few months.**

**19. What would you like to do with technology that you are not able to do now? What would you need in order to accomplish this?**

**20. Please add any additional comments about the district's technology professional development and implementation that you feel are pertinent.**

This format requires more effort as respondents may be asked to recall and relate prior experiences, synthesize information, or summarize professional issues.

None of these question structures is inherently best. Each has merits and is suited to providing a particular kind of information. In designing the survey instruments, the researcher sought a strategic balance of question structures to provide a rich set of data relevant to the core research questions. All questions were crafted for a particular population and purpose and in the context of other questions in the survey, with special attention paid to the length of the survey overall.

## SITE ADMINISTRATOR INTERVIEWS

An interview is an oral questionnaire. Instead of a written response, the participant answers an array of questions verbally in a face-to-face exchange. Best (1981) suggests that an interview may be superior to other data-gathering devices for a variety of reasons. First, participants are often more willing to engage in dialogue than to formalize their thoughts in a more exacting written venue. Secondly, assuming the interviewer is able to establish a safe, amiable rapport with the subject, certain types of seemingly confidential information may be obtained, information that an individual might be reticent to put in writing. Finally, through thoughtful follow-up questions and strategic probing, the researcher may nudge the interviewee toward greater insight and clarification.

The eight site administrator interviews served a strategic role in this study of Citrus Heights' technology professional development for teachers. The interviews were intended to provide substantive data related to three of the over-arching sub-questions in question two:

- What changes were noted in technology use, both professionally and with students in the classroom?
- What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?
- What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program?

Site administrators are ultimately responsible for the performance of their teaching staff. It is their job to regularly assess teachers through ongoing observations of practice. Citrus Heights' site administrators are expected to observe, analyze, and support teaching and learning on a daily basis. From this vantage point, principals have multiple opportunities to recognize refinements in teachers' practice. Site administrator interviews were structured to seek evidence of change related to teachers' experiences in the district's technology professional development.

Six open-form questions were designed to initiate, sustain, and deepen these individual interviews:

- Tell me how you came to be involved in technology and curriculum integration.
- Tell me about what you are doing to assist teachers to integrate technology into their classrooms.
- Describe the technology integration support structures in place at your school site. How do these affect your teachers' ability to teach using technology?

- When teachers integrate literacy and technology, do you focus on how technology assists children to learn? What are the literacy outcomes for this technology integration reform?
- How has the use of technology as reform impacted either short range or long range planning at your school site?
- Is there anything else you want included?

While site administrator interviews were designed as a strategy for data collection related to the impact of this district's technology professional development program, it was recognized that these interviews offered an important point of triangulation in the overall research design. This triangulation consisted of analyzing the administrator interview transcripts alongside the focus group interviews and the survey responses to determine the common themes found in each data collection piece. Appendix F illustrates the links among the research questions, participant surveys, site administrator, and the focus group interviews.

## **FOCUS GROUP INTERVIEWS**

There are multiple advantages in administering a survey. Surveys can elicit comparative data from a large number of participants, they are fast, they reduce interviewer bias, and they provide hard, quantitative data (Best, 1981). Yet, surveys cannot replicate the richness of more intimate, qualitative interviews. At best, surveys can produce a close estimate of what people think or do (Dillman & Salant, 1994). With this limitation in mind, a focus group interview was added to the research design to investigate research question two in greater depth. Participants volunteered to be in focus group interviews by clicking on a link embedded in the survey and were then contacted via email to schedule the interview.

Focus groups offer a mode of investigation in which a select group of invested participants are interviewed together to debrief and consider a shared experience. Group interviews are organized discussions led by a moderator and typically involve four to ten participants. The purpose of a focus group is to stimulate participants' thinking and elicit shared ideas, explanation, and descriptions of a specific topic or process (Salant & Dillman, 1994). Rubin and Rubin (1995) stress the value of this group dynamic, as members are able to "spark off of one another, suggesting dimensions and nuances that any one individual might not have thought of" (p. 140). The interactive nature of group interviews can lead to new and different understandings of a problem, process, or event.

The focus group interviews were structured through a set of open-ended questions intended to elicit qualitative data about teachers' perceptions about, implementation of, and impact of this district's technology professional development. The following questions were used as the interview protocol with the third through sixth grade teachers:

- Tell me about a recent experience using technology to build student literacy.
- Talk about what has supported your integration of technology.
- Talk about what has gotten in the way of your integration of technology.
- Talk about your experiences collaborating with others around technology.

And, the following question protocol was used with the teachers known as the Tech.

Core:

- Tell me about the content for professional development this year.
- Describe a typical professional development session.
- Talk about the follow-up and feedback structures in place to support technology integration.
- How are you measuring the impact this year's professional development is having on teaching and student learning?
- Talk about the supports and challenges you've noticed teachers have faced this year with technology integration.

The questions follow the research sub-questions in order, for ease of data analysis and are open-ended to support a risk-free flow. The primary questions were designed to be bias free, jargon free, brief, and invitational:

- How did you become involved in technology and curriculum integration in your classroom?
- Tell me about a recent experience using technology to build your students' literacy skills and/or knowledge.
- What recent lesson or series of lessons best represents your ideal of technology integration?
- Talk about what has supported your integration of technology into your classroom curriculum.
- Talk about your experiences collaborating with others around technology.

The prepared questions were not dependent on a linear or sequential presentation. Rather, it was anticipated that the questions would be adapted to fit the conversational needs of and lines of thinking explored by the focus group and could vary slightly so the natural

flow of conversation was not interrupted. The five primary questions were supported by a series of secondary probes that could be used to guide the participants toward depth, clarity, specificity, and/or elaboration. In no case were these probes used in their entirety and in some cases unanticipated prompts were added.

### **Protection of Participants**

This research study received approval by San Diego State University's Institutional Review Board and the University of San Diego's Committee on the Protection of Human Subjects. Both committees required evidence of substantive risk-management procedures. A number of protection processes serve to safeguard participants' rights to safety and privacy. All of the Institute's requirements were met.

The participant surveys were designed to assure respondents' anonymity. While certain demographic information was sought as part of the data collection process, these results were not used to identify individuals or school teams. Participants were assured that no identifying information, including any participant's name, school, or physical appearance would be used. All focus group and interview participants signed a written consent form, prior to their session, detailing the risk management procedures afforded by the researcher (see Appendix G).

Participants were informed that the interviews would be recorded and that a confidential transcript would be created. The researcher was the only person with access to these tapes and transcripts. Following the conclusion of this study, all recordings and supporting documents were filed in a secure location, where only the researcher has access for seven years.

### **Data Analysis**

Three inter-related data collection methods were used to examine participants' perceptions about and the application of the district's technology professional development – a survey, interviews and focus groups. This set of investigative methods elicited multiple voices, multiple perspectives, and multiple sources of evidence by providing a variety of through which to collect, analyze, and synthesize data. The methodological organization afforded both a wide-angle lens, from the district administrator interviews, to describe the comprehensive context for inquiry and a zoom lens, from the survey responses, site

administrator interviews, and the focus group interviews, to detail the more subtle nuances of participants' experiences and perceptions (Denzin & Lincoln, 2003).

Each of the research questions has been aligned with the data collection options. Following each table and research question or sub-question, the data review procedures are explained in further detail.

Quantitative data were obtained using an online survey and analyzed using the Statistical Package for Social Sciences (SPSS) program. Results of the study were reported using descriptive statistics such as frequencies and percentages.

For quantitative data, several steps were taken to ensure a thorough analysis (Table 1). First, descriptive statistics were generated for all demographic components of the survey. Then, to check the accuracy of the data set and to understand variations in the survey responses, descriptive statistics were computed. The following summarizes the tests generated.

Since the survey gathered nominal and ordinal data, special care was taken to ensure that the appropriate statistical tests were applied. In cases where the data indicated differences between categories, a Chi Square technique was utilized, and T-tests were used to indicate differences in means. For question comparison with ordinal data (i.e., strongly disagree, disagree, no opinion, agree, strongly agree), a Mann-Whitney U technique was used. In cases where multiple responses were elicited within the same question, a summation of the ranked scores served as interval data in the analysis and Mult. Response test was employed. For total scores in technology confidence, influences on technology use for teachers, and student technology use, comparisons were made among groups using t-tests and Chi-square. T-tests were used to test the means of all data in these categories. Then, the data were recoded into categories and a Chi-square was employed.



Table 1. Support for Research Question 2, Sub-Question 1

<i>Research Question 2: How do teachers perceive their ability to use technology and apply it in their teaching in order to promote student literacy learning?</i>		
<i>Research Sub-Question 1 - What differences were noted in the teacher's ability to use technology, both professionally and with students in the classroom?</i>		
<b>Survey Data</b>	<b>Data Analysis</b>	<b>Interview Data</b>
<p><i>Section 1 – Participant Profile</i></p> <p>A. Grade</p> <p>B. Years in teaching</p> <p>C. Years in this grade</p> <p>D. Years in this district</p> <p>E. Professional Development group</p> <p>F. Computer to Student ratio</p> <p><i>Section 2 - Technology Confidence</i></p> <p>Q7 – Likert Scale:</p> <p>A. I like to teach with technology.</p> <p>B. Teaching with technology is fun.</p> <p>C. I do not feel confident about teaching with technology.</p> <p>D. My teaching with technology improves my students' reading and writing skills.</p> <p>E. I have learned new tricks and better strategies for teaching with technology this year.</p> <p>F. I have re-assessed how I teach with technology this year.</p> <p>G. I have not changed the way I teach with technology this year.</p> <p>H. I am not confident in talking about teaching with technology with peers.</p> <p>I. I am a leader in teaching with technology in my school.</p> <p>J. I could train others how to teach with technology better.</p> <p>K. I design learning opportunities that integrate technology in order to support the diverse needs of my students.</p> <p>L. I do not use current research when planning for technology integration.</p> <p>M. I do not use technology resources, nor do I take the time to evaluate them for accuracy and suitability for my students.</p> <p>N. I plan for the management of the technology resources within my classroom/school site.</p> <p>O. I am aware of the technology standards for students and apply them when planning my curriculum.</p> <p>P. I use technology to develop students' higher order thinking skills and creativity.</p> <p>Q. I do not use technology in assessing student learning.</p> <p>R. I do not use technology to analyze student data.</p>	<p>Frequencies run on all Questions</p> <p>Recalculations for Grade-level groupings; Teaching experience; and PD Group</p> <p>Total score computed for overall technology confidence.</p> <p>Grand mean calculated for Tech Confidence</p> <p>Top five calculated</p> <p>Bottom five calculated</p> <p>T-Test - Q7 by Teaching Experience; Q7 &amp; PD Group; Q7 &amp; Grade</p>	<p><i>Administrator Interviews:</i></p> <p>What changes have you noted in the literacy instruction of those teachers from your school that attended this district's technology professional development this past summer or through this year?</p> <p>Describe one or two examples of technology use in the third through fifth grade classrooms</p> <p><i>Focus Group Interviews:</i></p> <p>What teaching practices have you changed or will you change as a result of your experience in this district's technology professional development?</p>

Table continues

***Research Question 2: How do teachers perceive their ability to use technology and apply it in their teaching in order to promote student literacy learning?***

***Research Sub-Question 1 - What differences were noted in the teacher's ability to use technology, both professionally and with students in the classroom?***

<b>Survey Data</b>	<b>Data Analysis</b>	<b>Interview Data</b>
<p>S. I use technology to communicate student academic success to parents, collaborate with my colleagues, and/or to the larger community.</p> <p>T. I promote safe and healthy use of technology resources.</p> <p>Q8. Besides the District professional development program, what influences your use of technology?</p> <p><i>Section 3 – Site Implementation;</i>            Q15. How often (per week) are your students engaged with educational technology for each of the following purposes?            Q16. From the following list of technology uses, select 3 that you feel have the most significant effect on student achievement and rank order those three items only.</p>	<p>T-Test - Q8 Influences &amp; Teaching Experience            Frequency run for Q7 &amp; Q8d</p> <p>Grand Total calculated for Q8            T-Test - Q8 Influences &amp; Teaching Experience; Q8 &amp; Grade level taught;            Chi-Square Q8 – Influence</p> <p>Frequencies on Q15 &amp; Q16            Chi-Square Q15/16 &amp; Teaching experience &amp; PD Group &amp; Computer to Student ratio</p>	

Initially, the researcher wanted to look at differences over a wider variety of categories, but then the categories were collapsed due to the small sample size,  $n=28$ . The SPSS program was used to create the initial response distributions for each item in this section. A value was designated as an identifier of the outcomes in SPSS program. For example: “1” was identified as elementary, and “2” was identified as middle in recoding grade level. Teaching experience was recalculated into two groups as well. “1” identified teachers who had been teaching from one to ten years, and “2” identified teachers who had more than ten years of experience.

To analyze participant responses in Section Two of the survey, Technology Confidence, all responses to each characteristic were assigned a score by adding the total group of question responses for each participant. This section contained twenty questions for which a five-point scale was developed, based upon the Likert Scale used on the survey

(1 = Strongly Disagree, 2 = Disagree, 3 = No Opinion, 4 = Agree, and 5 = Strongly Agree), and a total score was then calculated for each participant. This total score was then used to compare groups with differing levels of teaching experience and differing amounts of professional development, both found in the demographic section of the survey, Section One. The top five positive indicators for technology confidence were calculated along with the bottom five indicators.

After initial statistical analysis, other comparisons were analyzed between the technology confidence total score and implementation of technology when a statistical significance was found. These included how often the teachers' students were engaged in technology use and teachers' perceptions of the impact of technology use upon student achievement. These results were then compared to the interview data from both the Administrator interviews and the focus group interviews. This researcher hypothesized that how often students engaged in technology use is independent of the grade level taught by the teacher but dependent on the amount of professional development in which a teacher has been involved. Statistical analysis included frequencies and a Chi-Square comparison of teaching experience and the amount of professional development experience to student technology uses.

Research sub-questions two and three are directly related each other and both included directions to, "Check all that apply." Sub-question two elicits responses about the supports for integrating technology and sub-question three focuses on the barriers to a teacher integrating technology. Totals were calculated to determine those factors most supportive and those factors that impeded teachers' ability to implement technology integration within their classrooms. This researcher hypothesized that how often teachers felt supported is independent of teacher's experience and of the amount of professional development in which a teacher has been involved. Statistical analysis included frequencies and a Chi-Square comparison of teaching experience and professional development experience to the number of supports identified by the teachers. And, this researcher hypothesized that how often teachers felt impeded is independent of the teacher's experience and of the amount of professional development in which a teacher has been involved. Statistical analysis included frequencies and a Chi-Square comparison of teaching experience

and professional development experience to the number of barriers identified by the teachers. This analytical support for sub-questions two and three is summarized in Table 2.

**Table 2. Support for Research Question 2, Sub-Questions 2 and 3**

<b>Research Sub-Question 2 – What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?</b>		
<p><b>Survey Data</b>  <i>Section 3 – Site Implementation</i>            Q10-Which factors serve to support your implementation of the instructional strategies from the district technology professional development sessions? Check all that apply.            Q11. What has been the most helpful in supporting your integration of technology?</p>	<p><b>Data Analysis</b>            Totals calculated for Q10            Frequencies run on Q10            Chi-Square for Q10 &amp; Teaching experience (re-grouped) &amp; PD Group (re-grouped)</p>	<p><b>Interview Data</b>  <i>Administrator Interviews:</i>            What are the events or contexts that appear to facilitate teachers' change process?  <i>Focus Group Interviews:</i>            What site structures support or impede your implementation of technology?</p>
<b>Research Sub-Question 3 - What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program?</b>		
<p><b>Survey Data</b>  <i>Section 3 – Site Implementation</i>            Q12- Which factors serve to impede your implementation of the instructional strategies from the district's technology professional development? Check all that apply.            Q 13. Please describe what you see as the biggest barrier to your technology integration/ implementation.</p>	<p><b>Data Analysis</b>            Totals calculated for Q12            Frequencies run on Q12            Chi-Square for Q12 &amp; Teaching experience (re-grouped) &amp; PD Group (re-grouped)</p>	<p><b>Interview Data</b>  <i>Administrator Interviews:</i>            What are the events or contexts that appear to impede teachers' change process?  <i>Focus Group Interviews:</i>            What site structures support or impede your implementation of technology?</p>

Section four, Site Implementation, included directions to, "Check all that apply." This question was meant to elicit teachers' perceptions about their input into professional development. Totals were calculated to determine the areas most prominent for teacher collaboration and input. This researcher hypothesized that how often teachers felt they could collaborate is independent of a teacher's experience and of the amount of professional

development in which a teacher has been involved. Statistical analysis included frequencies and a Chi-Square comparison of teaching experience and professional development experience to the number of areas of input identified by the teachers. This analytical support for sub-question four is summarized in Table 3.

**Table 3. Support for Research Question 2, Sub-Question 4**

<i>Research Sub-Question 4 - What were the characteristics of collegiality and/or collaboration between teachers?</i>		
<p><b>Survey Data</b>  <i>Section 4 – Collaboration</i>            Q17. In which areas do you feel you've had input?</p>	<p><b>Data Analysis</b>            Totals calculated for Q17            Frequencies on Q17            Chi-Square for Q17 &amp; Teaching experience (re-grouped) &amp; PD Group (re-grouped)</p>	<p><b>Interview Data</b>  <i>Administrator Interviews:</i>            How would you change this district's technology professional development to maximally impact your teachers' practices? Describe the technology integration support structures currently in place at your school site.  <i>Focus Group Interviews:</i>            Talk about your experiences in this district's technology professional development. What are your suggestions for future collaboration-coaching professional development trainings?</p>

### **CODING THE INTERVIEWS**

To analyze the data, the researcher read interview transcripts in their entirety to get a sense of the information provided during that interview. The interviews were then converted to plain text documents as required by HyperResearch®, the software used for data analysis. The text files created from interview transcripts were divided in units of data and coded by reading the text and assigning a labeling word or phrase that described the topic communicated by each unit, independent of the surrounding text. Units of data applied within

HyperResearch® are defined as contiguous text on a particular topic that one can understand without the assistance of surrounding text in the narrative (Erlandson, et al., 1993).

The following table lists the interviews taken with specific district administrators in order to answer research question one and the subsequent questions within.

**Table 4. Support for Research Question 1**

<i>Research Question 1 - What are the components of the technology professional development used in this district?</i>	<i>Interview Data</i>
What was the content of the technology professional development program?	Project Director
What structures, or formats, were used within the technology professional development program and within each session?	Project Director
How was the technology professional development program facilitated?	Project Director
What changes in resources occurred for and within the technology professional development program?	Director, Information Services
How does the district measure the outcomes of their technology professional development program?	Project Director

These interviews were transcribed following the same protocol for site administrators and focus group volunteers.

### **Developing Categories and Analyzing Interview Data**

This analysis involved working with the data, organizing it, and breaking it into manageable units to search for patterns or themes to discover what was important to report. First, the researcher searched for certain words, phrases or patterns that repeated themselves. According to Bogdan and Biklen (1992), “ data analysis is the process of systematically searching and arranging the interview transcripts, observation notes and other field notes that the research accumulated” (p. 145). The next step was to develop a coding system or coding categories to help analyze and sort the data.

Following the emergent category designation recommended by Erlandson, et al. (1993), categories of codes were developed during analysis. Before categories could be discerned for groups of related codes, though, individual codes were checked for accuracy and possible overlap using the following procedure. Once a code was assigned to a unit of

data, the next unit was read and a code assigned to it. If the new unit addressed the same topic as the previous unit, it was assigned the same code. If not, that unit of data was assigned a code that more closely matched the topic of that unit. This process was continued until all data had been coded.

Using HyperResearch® to pull together all units labeled with the same words or phrases, a text document was created that contained all units labeled with the same code. These text documents were read to determine if all units of data in each set were about the topic assigned and were appropriately assigned a code that described each unit.

When some codes were indistinguishable from others, the data assigned with those codes were combined and coded again with a label consistent with the topic of all units within that set, or the data were assigned a new code more descriptive of the topic addressed. Because new codes had emerged during the coding process, some units were assigned new labels. Once this level of coding was complete, a list containing all the codes assigned to the data units was compiled and printed. Using this code list to look for similarities in codes, the researcher grouped codes into potential categories that were assigned a title and a definition for that category. The data were then re-examined, re-coded, and new documents were created in HyperResearch® to determine if there were enough data units in a category to inform the study. Through this process, new categories emerged and other categories were either eliminated as not containing enough data to be supported, or added to a list that was explored with focus group participants in subsequent member-checking activities. Questions were generated from this list of categories that seemed viable but incomplete, following the advice of Erlandson, et al. (1993) for extending the categories. Once categories were identified, the researcher again read the data assigned to each. Similar categories were grouped and juxtaposed to others, allowing for the emergence of themes. These themes were member-checked with participants to support the co-construction of meaning.

By remaining open to alternative constructions, the researcher increased her ability to, “construct realities that are compatible and consistent with those that have been constructed by persons in the setting being studied” (Erlandson, et al., 1993, p. 119). The researcher continued the process of interviewing and analyzing data until no new themes emerged from data analysis. At this point, the data analysis had reached saturation. In the analysis of data, the researcher also sought to uncover negative cases. These pieces of data might refute the

researcher's reconstructions of multiple realities. Yet, these data were important because they can lead to alternative interpretations (Erlandson, et al., 1993). In this study, individual participants provided negative cases for some of the initial categories. In a few instances, all but one participant might express a reason for his/her persistence in the use of technology in literacy. This caused the researcher to re-examine the category assigned or the conclusion drawn based upon the information provided by the other participants. In some cases, this led to a new interpretation of the data.

### **ONGOING MEMBER-CHECKING**

The researcher summarized each site administrator interview in writing and shared the summary with the participant. Prior to the beginning of the focus group interview, participants were invited to make changes in the summaries, from the online survey, if there were inaccuracies or misinterpretations of what they intended to report.

Following the focus group interviews, the participating teachers were asked to review the interview summary and invited to make changes in these summaries if there were inaccuracies or misinterpretations of what they intended to report. In some cases the focus group teachers corrected misconceptions on the interviewer's part and sent these corrections to the researcher via email messages. Via email, the researcher asked additional questions aimed at further understanding the nature of their perceptions regarding technology integration in literacy. Once new categories no longer emerged, and data became redundant, no further contacts were initiated and conducted with that participant. The final summary of all data generated with each participant was provided to her/him for a third level of member checking.

### **THEMES**

As the researcher continued to generate and analyze data, themes were made more clear and modified or redefined with a new more explicit code. These themes were tested and refined throughout the study as data generation continued through subsequent interviews. Using HyperResearch, themes were generated and tested by using the software to pull together all data coded with particular words or phrases to see if there were enough data to support these ideas as themes. The suggestion made in Erlandson, et al. (1993) to reflect after analysis of each interview was followed in order to ensure that alternative constructions were



considered. By examining themes that emerged, additional questions for participants were suggested. This researcher also looked for data that might challenge themes.

### **REFLECTIVE JOURNAL**

Throughout the study this researcher maintained a reflective journal as a recommended tool for adding to the credibility, dependability, and the confirmation of constructivist studies (Erlandson, et al., 1993). The purpose of the reflective journal was to provide documentation of the emerging study, reconstructions of participant perceptions, and modifications in themes. Information about methodological decisions and the rationale for those decisions, logistical information, and personal reflections about this researcher's values and insights regarding what was happening in the study (Lincoln & Guba, 1985) were all recorded in the reflective journal.

Decisions regarding procedures such as which participant to interview and data analysis procedures were also recorded. Once saturation occurred with individual informants, categories that developed during data analysis from one participant but not others were chronicled for the development of subsequent questions for participants, as noted above. These disparities were also noted in the search for negative cases. Reactions to reading or events that stimulated ideas about the study were also recorded.

### **PEER DEBRIEFING**

Peer review provided an external check of the research process, much like the inter-rater reliability in strictly experimental research (Ely, et al., 1991; Erlandson et al., 1993; Glesne & Peshkin, 1992). The researcher also participated in peer debriefing to solicit feedback regarding emergent themes and data analysis (Lincoln & Guba, 1985; Erlandson, et al., 1993) from disinterested voices that played the role of "devil's advocate" regarding data analysis and other procedures. Four peers knowledgeable about qualitative research, quantitative research, and classroom applications of computer literacy provided this feedback. One of these peers is a tenure-track professor in another southwestern university who has conducted mixed methodology research. Another peer is a seasoned quantitative researcher in the public arena. The other two peers are seasoned qualitative researchers who have conducted studies of teachers and the implementation of innovations, including technology.

During data analysis, the emerging themes were challenged by these peers, which added to the credibility of the study. One read early drafts of the analysis and provided feedback about organization and interpretations of the data. Feedback from these peers guided revisions in the data analysis and themes. Subsequent interviews were held with participants to include questions to check understandings based on the feedback from the peer de-briefers as well.

## **Limitations of the Study**

### **ESTABLISHING AUTHENTICITY**

The data were verified through multiple steps. First, the data were triangulated through the collection and analysis of various sources of data: teacher surveys, site administrator interviews, and district administrator interviews. These multiple sources of data provided corroborating evidence and shed light on the themes that evolved out of the data analysis (Ely, et al., 1991; Erlandson et al., 1993; Miles & Huberman, 1994; Patton, 1990). As noted previously, the quality of constructivist inquiry and qualitative research is judged not only by the standard of trustworthiness, but also the criteria for authenticity. Many of the strategies above contributed to the authenticity of this study. Informed consent, member checking, and peer debriefing contributed to meeting the criterion of fairness in this study. Reflecting back to participants what the researcher heard during interviews to be certain the meaning was understood and the perspectives of the participants were focused upon, provided an opportunity for them to reflect on what they had said. This, in turn, contributed to building a relationship of trust, thus encouraging the development of authenticity for the study. By sharing summaries of the research as themes emerged, which included the perspectives of all the informants, the possibility for authenticity was provided. Every possible effort to protect the identity of the informants was made. The location of the schools in which participants taught was masked to the extent possible. Every effort to share the results with as broad an audience as possible will be made in the form of this case study report, ensuring that at a minimum every participant receives a copy.

## CONTEXT-SPECIFIC LIMITATIONS

This examination of the quality of and potential for a new model of professional development for teachers is admittedly context specific. Citrus Heights School District [a pseudonym], as mentioned in earlier chapters, has embarked on an ambitious, large-scale reform initiative in which the premiere strategy for student success is technology professional development for its classroom teachers. Fullan (2001) reports that for change to occur, “Major investments and procedures be established that provide literacy and mathematics materials and professional development for all school leaders, staff developers, and teachers” (p. 58). A system-wide and systematic commitment to professional development is somewhat unique. Thus, this case study research was designed specifically to strategically analyze an innovative model of professional development within the current context of Citrus Heights School District and to ascertain its effect on teachers’ use of technology in their classrooms, specifically focused on literacy teaching.

The time constraints imposed by this study are incongruous with the change process. Change often takes time to translate into practice (Fullan, 1994). Focus group interviews were scheduled the month following the initial survey to allow this subset of participants additional time to consider, internalize, and apply their learning. Yet even this time lag is considered insufficient to fairly assess the long-range potential and implications of this district’s technology professional development in promoting teacher change.

This district’s technology professional development is nested within a mixture of related support strategies raising a number of interesting and relevant questions: Would the results of this investigation be the same without the feedback and accountability mechanisms that exist for site administrators? Would the results be the same without supports offered by school-site technology core teachers? In what ways are these results dependent upon or independent of the array of centrally designed professional development opportunities that encourage continuous learning for all teachers? These questions clearly extend the boundaries of inquiry beyond the scope of the current study. No attempt is made to isolate the results of this district’s technology professional development from the context in which it exists. This decision respects the authenticity of this model as a component part of Citrus Heights’s comprehensive professional development program. Nevertheless, this study does

provide a contextualized and detailed case description of a technology innovation and the method by which it was instantiated in this particular district.

### **METHODOLOGICAL LIMITATIONS**

A mixed methodology was selected because it minimizes the shortcomings inherent in all methodologies. Three methodological strategies served to investigate the stated research questions: a large-scale survey, site administrator interviews, and focus group interviews. These methodological strategies impose certain limitations on the strength and generalizability of the data. The surveys, individual site administrator interviews, and focus group interviews are dependent upon participants' self-analysis and self-reporting, potentially problematic response modes. Kovaleski (2001) cautions that self-reporting strategies may be impacted by any number of personal, professional, political, and environmental variables. While the response mechanisms are problematic, so too are the sampling populations.

Although **all** site administrators agreed to be interviewed and do not fall in this category (i.e., the group was not sampled), the focus group interviews depended on non-probability sampling. The groups were formed based on volunteers, as was the online survey group. This procedure raises concerns about which sub-groups of teachers and technology core teachers elected to become part of the assessment process and which sub-groups chose not to participate. Dillman and Salant (1994) warn, "We have no way of knowing the accuracy of a non-probability sampling. It might be accurate, but then again, it might not. Hence, whatever new information is gained through the research applies only to the sample itself" (p. 64). It is recognized that selection bias strictly limits the generalizability of all assessment data.

Qualitative research design provides the researcher with an avenue to step inside the context of what is being researched. The nature of the research is descriptive and the researcher is concerned with process rather than simply with outcomes or products (Bogdan & Biklen, 1992). The description of a process or event is valuable when quantitative research designs do not provide the insight necessary to understand the participants' role in the process, and their perceptions of the experience (Gay, 1997).

According to Creswell, a researcher must "bracket" all preconceptions based upon previous experiences, "... so as not to inject hypotheses, questions, or personal experiences

into the study” (Creswell, 1998). Therefore, the following describes the previous experiences this researcher has had in order to bring to the forefront, and bracket, any preconceptions. The researcher came to this study with a background in elementary education (K-8th grades), as well as additional experience and interest in technology. The extent of technology integration within her own classroom had evolved over a thirteen-year period, beginning with the use of technology for her purposes, for example, to write her lesson plans. This use grew to include a plan book and lessons where her students used the computer for word processing. Later, the teacher became interested in software to give students practice with the skills being taught. This use then evolved into software that adapts to the user. Adapting software was intriguing and she began to investigate and use software that enabled students to create their own presentations (e.g., HyperStudio, KidPix, and Neighborhoods). And, in the final years as a classroom teacher, technology was integrated into most activities throughout the day, for example, students were using computers to create their own stories, practice skills in literacy, math, social studies and science, interact with books, build presentations based upon favorite literature, and use technology for persuasive presentations.

While working as a technology mentor teacher for a different school district, the researcher worked closely with teachers to integrate technology into their curriculum and has consistently looked for ways to make learning more engaging and interesting by utilizing the strengths of the Internet and other technology. She spent many hours using a computer for her own studies and searching for lesson plan ideas. Therefore, her personal experiences with the Internet and technology, in general, alert the researcher to the following presumptions:

- The use of technology can benefit teachers in both teacher planning and classroom instruction,
- Professional development in technology integration transfers to classroom instruction,
- Technology motivates children and increases success in literacy,
- Technology is the present and the future so the only way to provide high-quality teaching is to include technology or children will finish school deficient of the skills needed in today’s workforce, and
- Literacy means more than reading, writing, listening and speaking with respect to the printed page, but with respect to computers and the Internet as well.

Researcher bias may act as a further limitation to this study. Although on-going attempts were made to bracket prior experiences and maintain an impartial perspective in order to view the responses of all participants in a dispassionate manner, it remains possible

that bias impacted the examples that were selected for inclusion, the themes that were identified and investigated, and the way in which the data were synthesized and analyzed. To limit the potential for research bias, the survey was constructed with input from a variety of informed sources. The site administrator and focus group interviews were meticulously transcribed, and all data were carefully triangulated.

These factors impacted the purpose, design, and results of this study and yet, represent the authentic context in which the research was conducted.

### **CASE STUDY REPORTING**

The results of this inquiry are reported in Chapter Four and Chapter Five. By asking participants to review sections of the case study pertaining to them first, the credibility and confirmation of the results were tested against the perceptions of the participants. Lincoln and Guba's (1985) suggestion to report the results in a case study mode was followed. The intent of this case study is to provide description that places the reader vicariously in the experiences of the teacher-participants. In this way, readers will be able to judge how the experiences of these teachers might be applied in their own settings. Understanding how some teachers are able to overcome obstacles and continue to incorporate technology into their classroom practice can inform other teachers, administrators, and educators who seek to do likewise.

## CHAPTER 4

### RESULTS

Hawley and Valli (1996) found that the convergence of research on learning, the growing recognition that teachers make a critical difference in what and how students learn, expectations that all students should attain higher academic standards, and the virtually unanimous agreement that educators' opportunities to learn are usually infrequent, poorly designed, and inadequately delivered has led to considerable attention being focused on the need for and characteristics of effective professional development as a key to school improvement (pp. 136-137).

This chapter presents the data analysis and findings from a case study of Citrus Heights School District's technology professional development program. It is organized around each research question and its associated sub-questions. The discussion includes data collected through district administrator interviews, an online survey with teachers, site administrator interviews, and focus group interviews with teachers. Data analysis unveiled the key characteristics of the technology professional development program in this exemplary school district. The key characteristics are:

- Multilayered
- Adaptive
- Progressive
- Responsive
- Collaborative

Mixed research methodologies guided this study of Citrus Height School District's technology professional development program. This process served to systematically explore the following research questions:

#### QUESTION ONE

What are the components of the technology professional development used in this district?

#### Sub-Questions

- What was the content of the technology professional development program?

- How was the technology professional development program facilitated? What changes in resources occurred for and within the technology professional development program?
- What structures, or formats, were used within the technology professional development program and within each session?

## **QUESTION TWO**

How do teachers perceive their ability to use technology and apply it in their teaching in order to promote student literacy learning?

### **Sub-Questions**

- What differences were noted in the teacher's ability to use technology, both professionally and with students in the classroom?
- What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?
- What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program?
- What differences were noted in the characteristics of collegiality and/or collaboration between teachers?

In order to put these findings in context, the chapter begins with an overview of the setting in which the research was conducted.

## **DISTRICT OVERVIEW AND BACKGROUND INFORMATION**

The District began its technology-based reform in 1998 to incorporate technology as part of the instruction. Under the guidance of the Director of Information Services, Citrus Heights developed a five-year technology plan in which the District would serve as the communication hub for the entire community. A microwave tower, located at the District office, connects each school and city facility, with each having its own microwave, fiber-optic link and/or laser in order to access the programs needed from workstations in classrooms and offices. All city government facilities have been wired including City Hall, the fire department headquarters and stations, Public Works headquarters, the recreation department, and the community, teen, and senior centers. Under the leadership of the Director of Information Services, the District developed a Connected Learning Community model becoming an educational application service provider (EASP) for the city's entire community using server-based computing, thin-client technology (the use of a terminal rather



than a full computer), and a high-speed cable modem network. A web-based interface acts as a common portal, linking the city to the educational community plus ensuring that families throughout the city have an equitable advantage to informational technology access.

Throughout this process, the District has partnered with several key businesses to develop the thin-client computing devices<sup>1</sup> that evolved into durable appliances easily used by students. These devices lowered the financial burden of desktop computing models and, ultimately, the student to computer ratio (from 1:4 to 1:2 and in the most recent stage of the District's reform to 1:1). Every classroom is connected to the network, with all computers in those classrooms connected to the Internet.

The District was further able to deliver high-speed Intranet connectivity between the District and students' homes. Using cable modem technology and a network appliance – developed in conjunction with yet another business partner, students were then able to access the Internet as well as resources at school from home. With increased access at home, children were able to complete homework assignments online and submit them via e-mail. Parents began to communicate more often with teachers. Research was made easier using filtered Internet access to connect to education-related sites. BigChalk Library®, a collection of more than 1,500 current and archived periodicals and newspapers, and Encarta Online Deluxe®, an online encyclopedia, were then available. This connection expanded literacy beyond the traditional classroom, not only for students but also to family members and other subscribers in the community.

In today's climate of accountability, districts develop their own goals statements to improve achievement for all students. School boards then allocate funds to support teaching and learning in facilitation of reaching their goals and objectives, to simplify a very complex and politically charged process for the purposes of this analysis. The Citrus Heights School Board supports this technology-based educational reform by adding technology specific items to its goals and objectives. In 2004, for example, a statement regarding classroom

---

<sup>1</sup> Thin client technology refers to the use of a desktop device that is an alternative to a full computer, more commonly called PCs. PCs have large operating systems and applications installed locally which require significant maintenance and support. Thin clients have an optimized operating system and graphical user interface with no applications installed locally, which then connect to a large server. The servers run the software that is displayed on the thin client terminal, therefore requiring minimal management and administration at the user desktop. This system is known as server-based computing and greatly decreases the expense of adding computers to the classroom setting.

Intranet websites was added to the District's goals and objectives, requiring all teachers to build and maintain their own websites.

Citrus Heights' Goals and Objectives include the following:

Goal: Every child incorporates technology in problem solving, communicating, and extending his or her learning. Objectives to meet that goal include:

- All classroom teachers will provide students with a current and engaging classroom Intranet site to support their learning and increase parent understanding of the instructional program;
- All classroom teachers will increase the use of online resources and instructional programs to reinforce student learning and integrate technology into the mastery of the academic content standards;
- All schools will increase family participation in the Project's Home Connection through the academic intervention program and fee-based services;
- All instructional staff will use the Instructional Data Management System® (IDMS) to manage state and local assessments and analyze student performance by race, socioeconomic level, language proficiency, and program participation;
- All instructional staff will use the SuccessMaker® reports to target basic intervention for students;
- District staff will expand the One-to-One @ School and Home program, in partnership with Cox Communications, the Classroom of the Future Foundation, and the San Diego Foundation;
- All middle school teachers will use PowerGrade® to report student progress and class assignments to students and parents;
- District staff will implement the EETT (Enhancing Education Through Technology) Competitive Grant at the middle schools.

With the development of clear district goals, the board's willingness to fund initiatives in support of these goals, and an award-winning professional development program to ensure teacher readiness to meet them, this school district is the ideal setting to further the study of professional development in educational technology.

The remainder of this chapter will address each research question, including the sub-questions, through the data gathered from each source.

### **RESEARCH QUESTION ONE**

In order to illuminate the components of the technology professional development in Citrus Heights, informational interviews were conducted with district administrators – the Superintendent, the Director of Information Services (IS) and the Project Director. The

purpose of this research question – what are the components of the technology professional development used in this district – was to focus on the program of technology professional development utilized within this exemplary district and how the program evolved over the course of the reform within this district.

This broad picture will separate into a more detailed look at the reform process (years 1997 – 2005) through the following research sub-questions and the themes that emerged from the data.

### **Sub-Question One**

This research sub-question – how was the technology professional development program facilitated – was designed to illuminate how the District developed and facilitated the technology professional development program for teachers. Interviewing District administrators was the data collection technique used to address this question. The researcher met with the Superintendent, the Director of Information Services, and the Project Director.

### **THEME ONE: MULTI-LAYERED APPROACH**

The District developed a multi-layered approach to their technology professional development program that grew out of the visionary leadership of the Director of Information Services. Initially, the District administrators recognized that early efforts, during phase one of the reform, impacted a very small portion of the learning environment; teachers were using the computer station on their desks for email and to do daily attendance. To begin the very daunting task of developing a technology professional development program, in 1997, the Director of Information Services joined forces with one of the District's principals, who became the Project Director for this new technology reform program; together, they developed a technology plan that included taking delivering the District's first technology staff development. They recruited a small group of eight teachers who were eager to integrate technology. The first steps the District took were to change the physical configuration of these teachers' classrooms by removing the student desks and replacing them with computer desks (where students would sign on to the computer upon their arrival in class each day) and then wiring each of these classrooms to support the increase in electrical demands as well as Internet access.

While this complete reconfiguration of classrooms was occurring, the small group of teachers was involved in a one-week professional development session prior to the opening of the new school year. Their training focused on taking what the teachers already knew about basic computer skills and building their knowledge about software available in the District, using the Internet, beginning to integrate technology into their daily curriculum, and ways to manage a classroom centered on students using technology. The following year, district officials asked for volunteers again by contacting school site administrators and twenty percent of each site's teaching staff, based upon principal nominations, was invited to be involved; however, this time, teachers who had previously participated were now the trainers/leaders of the training—instrumental in coaxing others to participate and the technology professional development program officially commenced. In this manner, the District trained 20% of each school's faculty each successive year. By 2005—when this study was conducted—all teachers in the District had participated in at least one year of training. As new teachers join the District, they will be brought into the training process as well.

Each grade level was represented in summer training—as was each school. These summer trainings were known as mini-camps. The camps have been differentiated not only by skill and knowledge levels, but by grade level interests as well. Each year, teachers were asked to volunteer and anyone interested was also allowed to attend the camps.

Beginning in 1999, the second phase of the professional development program in Citrus Heights School District, those teachers interested in continuing were also recruited to form the technology core group, known as the "Tech. Core." The Tech. Core's charge, which has continued to this day, was to conduct site-based professional development, generally held after school with volunteers. The Tech. Core also supported once per month, school site, curriculum integration afternoons led by the site administrator. This group was also recruited to lead, facilitate, and support the summer mini-camps under the Project Director's guidance and leadership.

### **Summary**

Not commonly found in technology training throughout the country, a key characteristic of this successful, exemplary school district was the multi-layered approach to

the technology professional development program that evolved through the years of reform. Every teacher was given the opportunity to attend a summer mini camp with an atmosphere where teachers are students, their attempts are celebrated, and they are given time to develop units they will use with their students. In addition, this district has Tech. Core members located at each school site to help with individual struggles and to help facilitate monthly integration training sessions held at school sites, as well as, many follow-up sessions throughout each school year. The literature suggests this follow-up training and support to help teachers at their point of need when they are approximating their new learning (Cambourne, 1988) is a key ingredient to successful professional development programs. Finally, through the use of technology, teachers developed tools to help each other, and posted these tools on the District's intranet website for the purposes of sharing and guiding their colleagues, including the online resources developed by the Tech. Core teachers.

Due to the fact that there was minimal guidance or research on how to reform an entire school district through educational technology, facilitation of the professional development program has evolved since Citrus Heights began its reform in 1997. The Project Director summed up her feelings about the lack of guidance for technology-led reform in her statement,

And that's one thing we found when we went to all those [project director] meetings in Washington, D.C., about evaluation, about how to structure our professional development. There was really not much out there. I was very disappointed. So, when I came back here and we sat at a meeting, I said, 'Well, I guess it's us. I guess we're gonna have to figure this out.' And that's just what we did.

The Project Director, working collaboratively with the Director of Information Services and the school board, developed a structure for the professional development program in order to train the teachers to use whatever technology became available to them. The following section illuminates the content of the professional development program and the resources that were made available through the course of the reform.

### **Sub-Question Two**

Sub-question two had two parts – (1) what was the content of the technology professional development program, and (2) what changes in resources occurred for and within the technology professional development program – and the purpose was to gain a

better understanding of how the District designed the technology professional development program and using the resources that changed through the reform. The technology professional development program emerged over the course of seven years, unfolded down into five phases, and depended, in part on technology advancing to meet the needs of teachers and students, as determined by the leadership of the Director of Information Services and the Project Director.

The following section explains the evolution through these phases, both the content addressed and the changes as the new technology resources were developed and became available to use in the classroom. The themes that emerged through this investigation are also highlighted throughout the narrative. Table 5 summarizes the phases, by highlighting the themes, years, professional development topics, and resources associated with each phase.

The summer mini-camps included everything from the basics of operating a computer and mouse to more advanced uses of digital cameras, data analysis, and integrating technology into the curriculum. In the beginning years, teachers attended all sessions offered, but as the group of participants grew every year and the skill levels of each teacher expanded, teachers were given the opportunity to self-select the sessions at the mini-camps they would attend, which might include teachers new to the District choosing more advanced technology professional development due to more advanced skills using technology, yet still being included in district orientation sessions. The last three years have featured time for teachers to be trained in developing a classroom website, while still offering sessions in more basic computer uses for those who self-selected this support. The selection of participants played a role in this phenomenon as well. The teachers, who were selected by administrators to join the reform in later years, were more likely to choose workshops supporting basic uses of computers due to their personal reluctance using technology. Finally, over the course of the reform, follow-up sessions were offered throughout the school year, which gave teachers opportunities to share what was working or not working, get support with previous learning, and do some planning for the integration of technology.

**Table 5. Phases of Citrus Heights' Reform**

<b>Phase And Emergent Theme</b>	<b>Years</b>	<b>Professional Development</b>	<b>Resources</b>
1 Multi-layered	1997 - 1999	<ul style="list-style-type: none"> <li>• Email</li> <li>• Basic computer skills – mouse, file management, etc.</li> <li>• Internet navigation</li> <li>• Word processing</li> <li>• Student software – CCC (SuccessMaker)</li> <li>• Equipment trouble-shooting</li> </ul>	<ul style="list-style-type: none"> <li>• Wired classrooms</li> <li>• 1:4 ratio</li> <li>• Computers for teachers</li> <li>• CCC - SuccessMaker</li> </ul>
2 Responsive	1999 - 2001	All of the above plus: <ul style="list-style-type: none"> <li>• Home to School connection</li> <li>• Digital Divide</li> <li>• Phases of technology integration</li> <li>• Digital cameras</li> <li>• PowerPoint</li> </ul>	<ul style="list-style-type: none"> <li>• Partnership with community – tower built &amp; community services offered (ISP &amp; phone)</li> <li>• Pilot of thin-client appliance</li> </ul>
3 Adaptive And Collaborative	2001 – 2004 “Thin-client Era”	All of the above plus: <ul style="list-style-type: none"> <li>• Web-based instruction</li> <li>• Webpages</li> <li>• CyberGuides</li> <li>• Classroom management</li> <li>• Curriculum integration</li> </ul>	<ul style="list-style-type: none"> <li>• 1:2 ratio</li> <li>• Classroom reconfiguration</li> <li>• Multimedia towers for students</li> <li>• District network</li> <li>• Thin-client and server-based computing</li> <li>• Pilot of 1-1 computing</li> </ul>
4 Progressive A	2004 - 2005	All of the above plus: <ul style="list-style-type: none"> <li>• Digital Natives<sup>2</sup></li> <li>• Project-based learning</li> <li>• Online grading and management of assignments</li> <li>• Online assessment</li> </ul>	<ul style="list-style-type: none"> <li>• PowerSchool</li> <li>• IDMS</li> </ul>
5 Progressive B	2005 - 2006	All of the above plus: <ul style="list-style-type: none"> <li>• 1-1 Computing</li> </ul>	<ul style="list-style-type: none"> <li>• Tablets with stylus</li> <li>• UnitedStreaming</li> </ul>

<sup>2</sup> Digital Natives is a term coined by Marc Prensky referring to students who have grown up surrounded by and using technology – computers, videogames, cell phones, digital music players, video cameras and all the other tools of the digital age (Prensky, 2001) – who are fluent speakers of the digital language of technology (Prensky, 2005).

## PHASE ONE

Professional development mini-camps during the first two years (1997-1999) were mostly skills-based. This first phase, summarized in table 6, coincided with the wiring and reconfiguration of classrooms, along with the integration of productivity software for teachers. The participants were taught mouse and keyboard skills along with learning the basics of reading a webpage and navigating the World Wide Web.

Teachers were expected to develop two lessons using technology during that school year. The requirements were general in nature – it was anticipated by the Project Director that the teachers would use the computer to introduce a new topic and build students' background knowledge by visiting a webpage, and introduce students to the software, SuccessMaker®, for reading support.

**Table 6. Phase One of Citrus Heights' Reform**

<b>Phase And Emergent Theme</b>	<b>Years</b>	<b>Professional Development</b>	<b>Resources</b>
1  Multi-layered	1997 - 1999	<ul style="list-style-type: none"> <li>• Email</li> <li>• Basic computer skills – mouse, file management, etc.</li> <li>• Internet navigation</li> <li>• Word processing</li> <li>• Student software – CCC (SuccessMaker®)</li> <li>• Equipment trouble-shooting</li> </ul>	<ul style="list-style-type: none"> <li>• Wired classrooms</li> <li>• 1:4 ratio</li> <li>• Computers for teachers</li> <li>• CCC - SuccessMaker®</li> </ul>

### Theme One – Multi-layered Approach

The multi-layered approach began to take shape as the Project Director and the Director of Information Services received feedback from the teachers through emailed reflections conducted at the end of each training session. It was through these comments that the Project Director determined a greater need for support throughout the school year and developed the idea for the Tech. Core teachers. The multi-layered approach offers many opportunities for teachers to get the support they need for specific issues that arise. The Tech. Core teachers were brought in to develop their own skills prior to beginning their leadership role for the summer mini-camps during phase two.



## PHASE TWO

Mini-camps in the second phase (1999-2001) added sessions on how to use PowerPoint, specifically, embedding sound, digital pictures, and hyperlinks on slides. This phase also incorporated using newly purchased digital cameras. The Tech. Core teachers facilitated individual sessions during each summer mini-camp and exposed participants to new websites they found useful, as well as, shared ways in which they were able to integrate technology into their own classrooms. During this phase, teachers were expected to develop two web-based lessons per school year.

### Theme Two - Responsive

It was anticipated that teachers would incorporate Internet research on teacher-selected websites or by using Webquests (Dodge, 1995), and the use of PowerPoint by students to showcase new learning (Table 7). The Project Director then responded to the needs of the teachers in order to meet these high expectations by expanding the Tech. Core teachers' leadership responsibilities at the school sites.

**Table 7. Phase Two of Citrus Heights' Reform**

Phase And Emergent Theme	Years	Professional Development	Resources
2 Responsive	1999 - 2001	All of the above plus: <ul style="list-style-type: none"> <li>• Home to School connection</li> <li>• Digital Divide</li> <li>• Phases of technology integration</li> <li>• Digital cameras</li> <li>• PowerPoint</li> </ul>	<ul style="list-style-type: none"> <li>• Partnership with community – tower built &amp; community services offered (ISP &amp; phone)</li> <li>• Pilot of thin-client appliance</li> </ul>

Throughout the professional development program, the staff has been attentive to the needs of the teachers. The Tech. Core teachers hold weekly office hours so that they are available to anyone that might need help. This type of responsive training is supported in the literature on learning where theorists suggest that adult learners share several essential characteristics with their younger counterparts: (a) all learners bring prior knowledge, beliefs, and assumptions to new experiences; (b) all learners must be motivated to acquire new skills, knowledge, abilities, or dispositions; (c) all learners must be actively engaged in the learning

process, and (d) all learners construct meaning within social contexts (Boyd, 1993; Lyons & Pinnell, 2001). The many robust opportunities for teachers to get support for the integration of technology leads teachers to be able to apply their new knowledge in meaning ways.

According to Kinnaman (1990), school administrators responsible for planning and developing technology professional development programs should consider the following. First, activities should be designed that will engage teachers in reflection about the benefits and limitations of teaching with technology. Second, professional development experiences should be provided that are ongoing and systematic. These sessions should allow teachers to develop their skill and comfort level with computers over time. Third, large group workshops should be supplemented with peer coaching and modeling sessions, allowing teachers to benefit directly from their colleagues' expertise. Fourth, professional development activities should be structured within the curriculum for which teachers are responsible, not isolated as a separate discipline. Fifth, professional development sessions should provide a great deal of hands-on, exploratory experiences with technology--giving time for teachers to reflect and share their ideas concerning how to use technology in the classroom.

The teachers were still operating with a 1:4 computer to student ratio within their classrooms. The District widened its impact with the community, developing a partnership with a local business to offer students access at their homes. This led to the next phase in the reform.

### **PHASE THREE**

The largest change came in phase three, school years 2001 - 2004. This transformation was due, in part, to the introduction of a new wireless device developed specifically for this district's use. In order to cost-effectively replace aging computer equipment while still striving for "finger-tip" access for all students, the District, under the visionary leadership of the Director of Information Services who formed a partnership with two local businesses, developed a wireless device that students could use both in school and at home. This device was not a full computer, but a terminal (or thin-client) that could access the District's new server. This server is housed in a portable building brought in to support this new technology. Along with this new wireless device, the District had a 95 foot

microwave tower built directly behind the central office. At this point, all eight schools contain a microwave dish that can transmit and receive information over the microwave computer network.

In order to fully use this network and new technology, each student was given an access code to their files, which they now saved at the District headquarters on the servers. The students and their parents now had instant access to their files and filtered Internet access from home as well as school. This Internet access was filtered through the District's secure servers via a web portal, powered by Apple's software, PowerSchool®, where an individual can sign in with their access information and gain entry to everything that is available to them from the District. All parents, those who have opted for the thin-client technology at home and those with their own Internet service, can view student attendance and test/assessment records, student created files, and communicate with teachers, using this secure web portal. Students can access their files, their attendance and test records, communicate with teachers and other students, submit work, and access filtered Internet content using this secure web portal. Now that students had access to a plethora of information within the District and outside on the Internet, teaching and learning began to change within the classroom.

With the addition of thin-client computing, the professional development program continued to evolve with the emergence of the classroom webpage (Table 8). The intention of the classroom webpage was to change the way in which teachers facilitated learning throughout each day and period of teaching in order to address student motivational and learning needs. Teachers began using constructivist teaching approaches (Barab, Hay, & Duffy, 1998; Beyersbach, Vannatta, & Walsh, 2001; Ferguson, 2001; Mouza, 2002) with the technology by beginning the instructional time from the class webpage. Here, students would access WebQuests, use outside resources on the Internet to build background knowledge and to develop their understanding of the concepts they were learning. This was particularly evident in the science and social studies content areas.

**Table 8. Phase Three of Citrus Heights' Reform**

<b>Phase And Emergent Theme</b>	<b>Years</b>	<b>Professional Development</b>	<b>Resources</b>
3  Adaptive And Collaborative	2001 – 2004 “Thin- client Era”	All of the above plus: • Web-based instruction • Webpages • CyberGuides • Classroom management • Curriculum integration	<ul style="list-style-type: none"> <li>• 1:2 ratio</li> <li>• Classroom reconfiguration</li> <li>• Multimedia towers for students</li> <li>• District Network</li> <li>• Thin-client and server-based computing</li> <li>• Pilot of 1-1 computing</li> </ul>

Therefore, through the professional development program, teachers were taught how to use FrontPage® software to create a webpage with the following information:

- Agenda with daily activities (date specific, assignments with links to support the learning on the Internet, web-based resources such as BigChalk® or Encarta®, and to teacher generated materials such as assignment rubrics, graphic organizers, etc.).
- Time schedule for the entire year (including any changes in routine for the day or week).
- Homework (date specific, with links to materials necessary to complete the assignments).
- Summary of subjects to be covered during the academic year.
- Web resources (links to the Internet, pertinent to the grade level and subjects).
- Content standards (associated with a current assignment or unit of study—and linked to the appropriate areas of the State of California Department of Education website).
- Teacher identified links within assignments (that require students to find appropriate information from subscription resources such as Encarta®, BigChalk®, eLibrary®, and in the most recent phase, United Streaming® videos in order to complete classroom activities).
- Links to web-based reference sources (such as Internet dictionaries, thesauruses, Wikipedia, atlases, encyclopedias, and maps).
- Student online portfolios (students using their own Intranet sites linked to the teacher site as a portfolio area to organize and maintain work in progress or completed work).
- Information for parents (such as static information about the class or year's study, with additional links to help parents as they support their children's learning from home).

- Classroom information and procedures (for instance, expectations, behavior guidelines, grading policy, etc. with an embedded link to communicate with the teacher).

During the first year of this phase, this thin-client program was piloted during the summer school program with teachers who volunteered to participate. The Project Director found this method the best way to, “work out the kinks before bringing large groups of teachers and students into something that might not work very well at first.” The Director of Information Services and the Project Director called this period the Server-based Computing or Thin-Client Era. During this phase, for participating teachers, the computer to student ratio changed from 1:4 to 1:2, with classroom furniture re-configurations into pods so that students would no longer have to move from tables to computers, but would have “finger-tip” access to the technology from their seats without having to move around the classroom. The thin-client technology had a great impact on this district. It allowed for greater student access (as demonstrated by the computer/student ratio of 1:2), less costly maintenance of computer equipment, and finger-tip access for the digital natives now in the classrooms.

This third phase also included the development of a cyber guide<sup>3</sup> called, Citrus-Aid (the name has been changed to keep anonymity), created by the Tech. Core teachers to support the teachers in developing their classroom websites when they went back to their classrooms. This guide evolved into a template in FrontPage that teachers could use to create a basic website that met the minimum requirements of the task. Teachers would then continue with the monthly meetings and enrich their websites as they shared what they had and what their next steps would be for their websites. This became the way that teachers shared Internet links to support instruction and learning. One example from a second grade teacher explains how she uses one website to support student needs:

I received an e-mail from a reading specialist and she said, "Well, check out this guy's website" and on there, he had a link to a program that is like Words Their Way and what they do is they do word sorts. So if you have a student who is having trouble sorting words by short vowels, this program will do that, well, it will allow the student to do that, I should say. Where the student will have short I words and short A words and then they have these cards and they click on them and drag them into the right pile and it goes all the way up to, you know,

---

<sup>3</sup> The Cyberguide (aka CitrusAid) is a list of steps to take to create a webpage and a template in FrontPage for teachers to just add info into in order to create their own websites that include the specifics that the District wants included in these teaching websites

diagraphs and blends and, you know, whatever you need for those kinds of literacy sorts.

A sixth grade science teacher noted the following resource for use in content area classes:

There is a website and it's called Get a Clue, which is a vocabulary building program and you can put your own word lists in. And I use that for Science words, but it's got a whole realm of vocabulary words as well just to build flat word knowledge and vocabulary knowledge. And you can kind of sub-sort it into the words that fit with your own content area a little better, too.

Although the CitrusAid was helpful, it was during the second year of this phase that the Project Director found the following to be true, "For the people that were stretching out, that was too constricting - they couldn't use different fonts, they wanted pictures brought in. It was not as simple as it should have been, so they came up with their own things to do." And, the later stages of Sandholtz, Ringstaff, & Dwyer's work (1997) began to take hold with these particular teachers. The CitrusAid was prescriptive, a detailed "how to" for teachers, but it didn't fully work for all teachers. The Project Director noticed a wider gap beginning to form between the teachers who were completely on-board with the reform efforts and those teachers that were just compliant with the demands made by the administration (Boling, 2005?). Therefore, the District refined its efforts to acknowledge the different levels of expertise that were beginning to develop within the teaching force.

The District re-energized its effort by bringing in well-known guest speakers who spoke to implementation issues that might slow the reform effort. Judith Sandholtz, for example, known for her work in the evolution of technology use within classrooms (Sandholtz, Ringstaff, & Dwyer, 1997), talked with teachers about the stages of implementation that they might go through as they employ these new strategies in technology within their classrooms and planning work. During these mini-camps, teachers were asked to reflect on where they saw themselves in this evolution of technology implementation. The participating teachers kept personal journals of their experiences and reflections, and kept in contact via email with the Project Director on their progress. This was another example of how this reform was responsive in order to meet the needs of the teachers as they grew in their own knowledge and progress with integrating technology.

### **Theme Three - Adaptation**

The District's professional development program has changed over the years. This, in part, can be contributed to the necessity for change in the technology over the course of the reform. The district began with desktop models and learned from student use that they needed to make changes. Therefore, the district worked in partnership with local businesses to develop technological solutions to meet the needs of the district and students (for example, the WinTerms® used at students' homes for access to their school files and the Internet). This ability to adapt was revealed in how the staff incorporated these new technologies, changed the content of the professional development sessions in order to meet the demands of district and state mandates, and grew from a 1:4 computing ratio to a 1:2 ratio for everyone, and a 1:1 ratio for 963 (third and sixth grade classes) of its 4,433 students.

When professional development sessions are completed in a one-shot session, there is no time to adapt and change for the needs of the audience. Through the reform, which has now stretched over an eight-year period, the Project Director has been able to change and adapt the training sessions to meet the needs of the teachers by offering sessions at varying skill levels. When the state has adopted new curriculum and/or textbooks, the professional development program has been adapted to incorporate support for new instructional strategies that integrate these newly acquired resources. The ability and willingness to be flexible and adapt is one of the strengths of this district's professional development program in technology. The district also began addressing the social needs of teachers within the District's technology professional development program.

### **Theme Four - Collaboration**

Many opportunities for collaboration were built into the structure of each professional development session. The atmosphere, during the summer mini-camps and at sessions throughout the school year, built by the supports and structures within this multi-layered program address the social needs of teachers. Teachers brought other teachers with them to the camps, both those at their same site and/or at the same grade level plus others they new within the district. The groupings were flexible at the summer mini-camps as well as enabling teachers with the same grade level curriculum to work together and those with more advanced skills to work together. Within the professional development sessions, the trainers,

who were all district teachers with their own classrooms, facilitated the development of teaching units that would directly support the classroom activities, and thereby engaged participants in more meaningful ways.

The importance of teachers' reflection on their experiences, which drove a large portion of this study, is underscored by the findings from Persky's (1990) study of teachers learning to use technology in which she concluded:

When teachers engage with others in ongoing reflection about their instructional use of technology, they are more likely to critically evaluate their practice and redesign instruction to better meet student needs and curriculum goals... In order to support teacher development, administrators must put structures in place so teachers can communicate and collaborate on a regular basis. (p. 37)

The comments from teachers in this study suggest the technology professional development program encouraged schools and grade level groupings to become learning communities. Certain key features are essential for learning communities to form, such as shared knowledge, respect, identity, membership, rituals, participation, influence, and a sense of belonging (McMillan, 1996; Fullan, 2001; and Riel & Fulton, 2001). Riel and Fulton (2001) assert that both students and adult learners benefit from participating in communities of practice and that technology facilitates interaction within learning communities. Online mentoring, distance education, and state-supported electronic networks open up the isolation of classrooms and offer teachers access to one another for ongoing support and professional development and sharing (Keller, Ehman, & Bonk, 2003). Keller, Ehman, and Bonk (2003) assert the use of technologies such as interactive lesson plan templates, multimedia databases, streamed video, web-conferencing, and e-mail can help teachers access other teachers for ongoing professional collaboration. Within Citrus Heights, the use of email in support of sharing is readily apparent. The use of lesson and webpage templates, as well as, web-based aids to support technology integration within the curriculum sustains teacher learning from the technology professional development program.

Coppola (2004) first maintains that incentive systems must be reworked if teachers are expected to change their practice and improve student learning. As with students, teachers learn better in the real setting of their own workplace and if they are not always isolated structurally and culturally from each other but do have some solitary reflection time. In other words, schools need to become learning communities where teachers learn as well as students.



Although their learning was highly individual, this researcher found some common intellectual processes: a commitment to use computers (where it made sense); a definition of pedagogical problems; scanning for new ideas and practices; creating new curriculum and practice; and, trying, reflecting, and refining. Teachers created uses particular to their own subject knowledge, pedagogical knowledge, curriculum and students and none used pre-developed software or curriculum. Coppola (2004) believes this type of creative process to be the essence of a teacher's learning and that it helps them produce both quality work and staying power.

This phase lasted three years, was marked by an adaptive and collaborative approach to professional development, and opened the door to a shift in how teachers were teaching in their classrooms; a shift from teacher-directed to a more student-centered approach. This shift was explored further in phase four of the reform.

#### PHASE FOUR

The next phase, phase four, included a major shift in the assessment practices within the District with the onset of software for organizing academic information called Instructional Data Management System® (IDMS). The District shifted to standards-based report cards generated through this system. So not only were the teachers trained in new software, but they were also trained in assessing students using a standards-based reporting tool. The topics from previous years' professional development were still stressed along with this new assessment protocol noted in table 9.

**Table 9. Phase Four of Citrus Heights' Reform**

<b>Phase And Emergent Theme</b>	<b>Years</b>	<b>Professional Development</b>	<b>Resources</b>
4 Progressive A	2004 - 2005	All of the above plus: • Digital Natives <sup>4</sup> • Project-based learning • Online grading and management of assignments • Online assessment	• PowerSchool • IDMS

<sup>4</sup> Digital Natives is a term coined by Marc Prensky referring to students who have grown up surrounded by and using technology – computers, videogames, cell phones, digital music players, video cameras and all the

This training was included in the summer mini-camp, as well as throughout the school year. All teachers were trained in order for all assessment data to be collected consistently and all report cards to be delivered electronically.

### **Theme Five – Progressive**

This District kept abreast of the latest technologies, current pedagogical research, and furthered their partnerships with local businesses to develop new solutions to the growing needs of the students and teachers within the District. This progressive approach was advanced by infusing multimedia within the learning environment in order to help teachers to see their changing role within classroom instruction – from teacher directed to student-centered – and by bringing assessment and data management to the forefront. This gave teachers the opportunity to focus instruction on the point of need for each particular student. The Project Director and the Tech. Core teachers were cognizant of the social needs of teachers within a very isolated career (Darling-Hammond, 2000; Knowles, 1973; Knowles, 1990; Shanker, 1996) and therefore, the professional development changed gears to address social concerns as well by validating what teachers were doing and widening teachers' understanding of the students within their classrooms.

The mini-camp during this phase started with a keynote address from Mark Prensky regarding the "Digital Natives" [students] now in classrooms. This speaker was chosen to validate the change in instructional practices that was developing within the District. Prensky brought forth the idea that students in classrooms today are using technology more than their teachers as an integral part of daily life. The paradigm shift of moving towards student-centered instruction would benefit the students more by addressing the needs of students' technologically savvy brains.

During a discussion of the presentation, the Project Director commented,

His slides were terrific, very vibrant, and it's like a digital version of saying, "You better pay attention or you're gonna miss out." He has a couple of things that he puts on there. For instance, one is a saying from a t-shirt that he saw in New York that says, "I don't have ADHD, I'm just not listening." Meaning that I'm not paying attention because you're not engaging me. So, I'm not motivated to listen. And so his thing is that you have to motivate them to learn. If you're not

---

other tools of the digital age (Prensky, 2001) – who are fluent speakers of the digital language of technology (Prensky, 2005).

motivating or engaging, they aren't going to learn, no matter what your lesson. You have to connect with your learner.

Prensky argues that teachers must use something different in order to engage and motivate the learners in classrooms today, specifically, technology with graphics supported by text, game-based learning that offers challenges, battles, multi-player role plays, and opportunities to expand, conquer, amass, build, and perform. One classroom teacher realized a simple opportunity for an online word sorting game motivated her students beyond what they were willing to even try with a simple paper and pencil:

From my webpage, I added a link to a program that is like Words Their Way, and what they do is they do word sorts. ... Where the student will have short I words and short A words and then they have these cards and they click on them and drag them into the right pile. It goes all the way up to, you know, digraphs and blends. Even the kids that didn't want to do it on paper and pencil are eager to do it on the computer. (Third grade teacher)

Prensky's words were turned to action through the injection of multimedia. The teachers began to research how they could bring multimedia into their classrooms. This task was difficult due to the small bandwidth available on the thin-client appliances once everyone was connected. This issue was addressed in the next phase of the reform.

## **PHASE FIVE**

In the final and current phase, the District launched one-to-one computing in all third and sixth grade classrooms. Through the District's business partnerships, a tablet was designed in the previous phase and piloted in a classroom at one of the middle schools and in another classroom at the elementary level. The tablet was altered to remedy design flaws in earlier models. The students were bringing the appliances back with cracked screens and broken parts. These redesigned tablets were made to withstand a six-foot tumble across the floor, a common occurrence reported by teachers and students. The tablet led to the use of multimedia/video streaming. These new tablets had a greater memory capacity and faster processors in order to run the multimedia video clips with little or no distortion. The District entered into a subscription with another company which gave teachers access to United Streaming, which includes video clips on many different subjects that teachers could now use for introducing new subjects, leading students into research and/or building background knowledge, or as part of a unit of study. The professional development program extended to include this new technology (note new topic and resources in Table 10).

**Table 10. Phase Five of Citrus Heights' Reform**

<b>Phase And Emergent Theme</b>	<b>Years</b>	<b>Professional Development</b>	<b>Resources</b>
5  Progressive B	2005 - 2006	All of the above plus: • 1-1 Computing	• Tablets with stylus • UnitedStreaming®

The revamped tablet had many advantages. Teachers were inspired to move around the classroom and to invite students to participate in what goes up on the screen for all to see. The District's idea was to move the teacher throughout the classroom, holding the wireless tablet, enabling a teacher to write and/or draw, or use software, to demonstrate the teaching point. This technique also allows students to be drawn into the teaching by inviting them to write, or draw, or interact with the software while the other students watch on the screen. The Director of Information Services remarked, "This tablet is meant to further enable teachers to make the learning more student-centered and even directed." Further, he believes this new phase, with its focus on one-to-one computing, will broaden the scope of what students are capable of doing in order to, "prepare our students for a global computing society."

In summary, professional development was relevant to teacher and student interests and needs due to the readiness of teachers and staff to take advantage of new technologies and ways of thinking about teaching and learning. The professional development program changed in both structure and content. Due to the progressive nature of the District, the resources acquired by the District were in direct response to how teachers were developing within this new paradigm of constructivist teaching.

### **Sub-Question Three**

The purpose of sub-question three - what structures, or formats, were used within the technology professional development program and within each session – was to determine the structures used by district personnel within the technology professional development program. Data to address sub-question three were drawn from a series of interviews with the Project Director and one lengthy discussion with the Director of Information Services.

When the professional development sessions began in the earliest phase of the reform, the Project Director designed all of the sessions. At first, the sessions were focused on the hardware and configuring the classrooms for all of the additional equipment. She noted: "When we were rolling things out, we had to go in and install equipment. We rearranged the rooms because with that number of computers, you can't have them just around the edges." All of the sessions were held in a classroom configured with the technology being showcased. They were hands-on, so each participant sat in front of a computer and did everything the Project Director was doing. These initial meetings covered the basics of computer usage, file management, and working in word processing programs for teacher productivity.

After the initial phase, the format for the summer mini-camps was developed. Each mini-camp followed this general format, which includes examples from the most recent summer camp:

- *Overview of the camp* – included the keynote speaker, the vision for the work, and a brief overview and showcase of new technologies.
- *Sessions during the camp* – these were divided into three categories:
  - Sessions for everyone - these sessions have grown over the years of the reform and now include:
    - Beginning a Class Website
    - Continuing Development of Classroom Websites (divided by grade level and into collaborative teams)
    - Interpreting SuccessMaker® Reports
    - Managing Files and Folders
    - Exploring Outlook® Email
    - Using the Digital Camera
  - Sessions for elementary teachers by grade level:
    - Integrating Houghton-Mifflin®, using graphic organizing software, Internet resources to build background knowledge and for research and collaboration, and using presentation and productivity software for publishing
    - Kidspiration® software - specifically for K-3 teachers
  - Sessions for middle school teachers by subject area:
    - My ePack® - file management program for students turning in assignments, teachers reviewing and commenting, and returning assignments to students
    - PowerGrade® - online grade book & report card system

The sessions within each camp also had a general format that the trainers followed:

- Overview of the goals and outcomes
- Reflection on current practices: Tech. Core teachers sharing current uses of technology and technology integration strategies
- Instruction built on prior experiences and focused on problem-solving
- Questions to guide and challenge thinking and new learning
- Direct instruction with real classroom applications
- Time for teachers to reflect on new learning in collaborative groups and/or partnerships
- Time to design lesson plans and update websites, and time to develop resources for student use along with webpages including links to learning resources.

Assisted by the Tech. Core teachers, the site administrators led the follow-up meetings at the school sites. These sessions followed the same general agenda format as the mini-camp sessions, with administrators adapting the agenda to fit the particular needs of the staff.

In summary, due to the ever-changing nature of reform in education and the cutting-edge style of this district, the format for professional development sessions changed over time and parallel to the resources available within the District. In the beginning, technology professional development was addressed with a top-down approach and somewhat mandated. But, as teachers' needs became clear, the Project Director designed, and adapted, a new format in order to meet the needs of this district's teachers, which is now the protocol used for a dynamic professional development session. Change was a recursive and dynamic process, which has resulted in the development of a protocol to follow for dynamic professional development.

### **Summary – Question One**

The formats and structures used within the professional development program and the content addressed were all developed in response to learner needs, which were assessed as the District conducted the professional development and follow-up sessions.

The components found in the professional development program within this district's reform are supported through the literature in three categories:

- Learning takes place within a built-in support network (McKenzie, 1999; Norton & Gonzales, 1998), for example, teachers from within the District became the trainers and follow-up sessions took place through the subsequent school year, with web-based resources for additional support.
- Learning follows a collaborative inquiry approach for teachers (U.S. Department of Education [ED], 2000, Becker, H. & Riel, M. 2000, Howard, B., McGee, S., Schwartz, N., & Purcell, S., 2000), for example, the sessions focused on problem solving after reflecting on current practices, and learning occurred in collaborative groups.
- Student learning is supported through problem-based learning and collaboration (Bryan, Merchant, & Cramer, 1999; Sandholtz, Ringstaff, & Dwyer, 1997; Thomas & Knezek, 2002; Walker, 1999), for example, problem-based learning units were developed during planning time within training sessions.

Through this process, the culture within the District's schools evolved from one of isolation to a collaborative effort. In doing so, the District's ambition to create organizational norms in which teachers work together, learn from each other, and study together as members of a learning community (Lyons & Pinnell, 2001; Sparks, 1999) were beginning to be reached.

The five themes that represent the findings are:

- Multi-layered
- Adaptive
- Progressive
- Responsive
- Collaborative

These themes are not uncommon characteristics found in and of themselves, but found within one professional development program is unusual. One way this district is attempting to address the standards-based reform expectations within California, and under the federal No Child Left Behind Act of 2001, is to develop and cultivate this multi-layered, flexible approach to support teachers' integration of technology.

Table 11 represents themes that emerged from this research and the factors that influenced the development of the theme categories.

**Table 11. Factors Influencing Themes**

<b>Theme</b>	<b>Factors</b>
Multi-layered Program	Summer Mini Camps Site-based professional development Tech. Core Follow-up group meetings Online resources
Adaptation	Physical environment Technology District and Board Expectations
Progressive Approach	Development of new technologies Guest speakers Summer Mini Camps Cohort quality to training
Responsive	Teacher needs
Multi-layered approach	Student needs
Collaboration	Teachers as trainers Opportunities

When professional development sessions are completed in a one-shot session, there is no time to adapt and change for the needs of the audience. Through the reform in Citrus Heights, which has now stretched over an eight-year period, the Project Director has been able to change and adapt the training sessions to meet the needs of the teachers. This District's professional development program grew to include sessions at varying skill levels, incorporating new technology resources, tailored to follow current pedagogy and support for new instructional strategies, and adapted to support newly adopted curriculum and textbooks.

Now that the structure and format of the professional development program are identified, we can continue on with the quest to understand how teachers perceive their ability to use technology and apply it in their teaching.



## **RESEARCH QUESTION TWO**

Research question two focused on teachers' experiences in the Citrus Heights technology professional development program and teachers' perceptions of their ability to use technology successfully – How do teachers perceive their ability to use technology and apply it in their teaching? Three data collection techniques were used to address this question – an online survey administered to third through sixth grade teachers in the District, focus group interviews with a volunteer subset of survey respondents, and site administrator interviews.

### **Sub-Question One**

The purpose of this research sub-question - what differences were noted in the teacher's ability to use technology, both professionally and with students in the classroom - was to examine teachers' perceptions of how their technology use changed after participating in the technology professional development program over time. The researcher looked at teachers' self-reported use of technology for planning, communication, and instructional purposes, as well as, student uses of technology. This sub-question was answered by Section Two of the survey, and two questions in Section Three. Section Two provided information on teacher technology confidence and implementation and part of Section Three addressed the frequency of student technology uses. Data were supplemented with site administrator and focus group interviews. Through this process, three concepts surfaced and are explored through this report of the data: confidence with technology, additional influences on technology use, and the perceived effects of technology on students.

### **ONLINE SURVEY**

The survey contained five sections:

- Section One – Participant Profile
- Section Two – Technology Confidence
- Section Three – Site Implementation
- Section Four – Collaboration
- Section Five – Final Comments

Section One, Participant Profile, focused on respondent demographics (i.e., grade level, years in teaching, etc.). Section Two, Technology Confidence, was created to yield a self-reflection score of technology confidence. The items in this section were organized around a standard Likert scale that ranged from strongly agree to strongly disagree. Ratings on each item were totaled to yield a confidence total score between 20-100. Section Three, Site Implementation, looked at teachers' perceptions of the process of implementing specific elements they had learned within the technology professional development program at the individual school sites. Section Four of the survey, Collaboration, asked respondents to reflect on the types of input they perceive they have within the different levels of the professional development program. Partially closed questions were selected for this section to allow participants as many selections as possible with an additional choice of "Other" for items not listed. Respondents were also given the opportunity for a brief narrative response. The last section of the survey instrument, Final Comments, included a small set of open-ended questions to garner participants' final reflections on the technology professional development program in which they've participated.

### **Section One**

The first section, Participant Profile, asked demographic questions providing a picture of participants and allowing the data to illustrate comparability to the District as a whole using a variety of criteria including participants' teaching experience, experience within the District, and hours of participation in the professional development program. All third through sixth grade teachers (n=63) were invited to respond to the survey. Altogether, 27 teachers submitted usable forms for a response rate of 43%. This section of the survey provides a picture of survey participants.

Due to the small sample size, grade levels were collapsed for statistical purposes and therefore sixteen teachers, or 53.6%, were teaching in the third through fifth grades and 46.4% of participants taught at the middle school level (sixth grade and other category). All survey participants answered this question.

Teachers in this district have a great deal of experience (see Table 12). The majority of participants in this survey, 53.8%, have been teaching for more than 10 years. 46.2% of

teachers have been teaching for 10 years or less. However, only one respondent reported teaching 3 years or less and one was a new teacher to the district.

**Table 12. Survey Participants' Teaching Experience**

<b>Years teaching:</b>	1 – 3 years	4 – 7 years	8 – 10 years	11 – 20 years	20+ years	Total
<b>Responses</b>	1	3	8	7	7	26
<b>Response %</b>	3.9%	11.5%	30.8%	26.9%	26.9%	

Consistent with overall teaching experience, the participants within this survey have a high level of experience in their present position; in fact, 81.4% reported teaching at their current grade level for at least four years. Table 13 summarizes teaching consistency at grade levels. As is common throughout education, there is some movement of teachers between grade levels. These numbers are representative of the overall demographics of this district.

**Table 13. Survey Participants' Years at Current Grade Level**

<b>Years at current grade level:</b>	1 – 3 years	4 – 7 years	8+ years	Total
<b>Responses</b>	5	9	13	27
<b>Response %</b>	18.3%	33.3%	48.1%	

Table 14 supports the idea that there is stability within the teaching community in this district. A majority of teachers, 60.7%, have been with this district for more than eight years. Darling-Hammond (2000) reports this percentage is above the average found in California, which can be as low as 50%. A more recent report by Olsen & Anderson (2006) found the retention rate to be even higher nationally, noting over half a million jobs in flux due to migration from school to school and those dropping out of teaching altogether. Loeb, Darling-Hammond, & Luczak (2005) noted working conditions and teacher salaries as well as student demographics having a large impact on teacher retention as well.

**Table 14. Survey Participants' Years in this District**

<b>Years in Citrus Heights School District:</b>	1 – 3 years	4 – 7 years	8+ years	Total
<b>Responses</b>	3	8	17	28
<b>Response %</b>	10.7%	28.6%	60.7%	

Table 15 summarizes the number of hours each participant self-reported as having attended by choosing the group they were affiliated to within the professional development program. Due to the small sample size, the professional development groups were collapsed for statistical purposes. Survey participants were divided into two groups, those with extensive professional development training (300+ hours; 52.9%) and those with less than 300 hours; 47.1%).

**Table 15. Survey Participants' Hours of Professional Development**

<b>Which professional development group are you participating in?</b>	<b>Group 1 400+ hours</b>	<b>Group 2 300-399 hours</b>	<b>Group 3 200-299 hours</b>	<b>Group 4 100-199 hours</b>	<b>Group 5 1-99 hours</b>	<b>Total</b>
<b>Responses</b>	7	2	4	2	2	17
<b>Response %</b>	41.1%	11.8%	23.5%	11.8%	11.8%	

## Section Two

Section Two of the online survey was designed to measure teachers' technology confidence. It featured 20 questions calling for participants to reflect on their own level of confidence using technology. Statements were modified from the NETS for Teachers (ISTE, 2000)—which is a document that outlines the educational technology standards for teachers. These standards are divided into six major categories:

1. Technology operations and concepts;
2. Planning and designing learning environments and experiences;
3. Teaching, learning, and the curriculum;
4. Assessment and evaluation;
5. Productivity and professional practice;
6. Social, ethical, legal, and human issues.

Performance indicators were developed within these categories, and from those indicators, 20 were selected to represent the six categories on the survey. All items used a Likert scale that ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). Participant ratings on the individual items were totaled; total scores could range from 20 – 100. Scores for the 27 respondents ranged from 52 to 100 ( $M = 76.04$ ,  $SD = 19.538$ ). Appendix H lists total technology confidence scores for each participant.

### Confidence Using Technology

Using an Independent Samples t-test analysis, the researcher compared the means of the total technology confidence scores of each participant across groupings by teaching experience, grade level and teacher hours in professional development.

Hypothesis testing was conducted to see if certain teacher characteristics were tied to differences in confidence scores. Specific hypotheses tested were:

- Hyp 1a: No difference in confidence scores by teaching experience
- Hyp 1b: No difference in confidence scores by grade levels
- Hyp 1c: No difference in confidence scores by PD group

There were no statistically significant results from testing these hypotheses and the three null hypotheses were retained. Results would be influenced by the small sample size in this study.

However, with a small sample size, differences may not be found in overarching measures, but in the detail. Additional analyses were computed to determine if particular items within the total technology confidence scale showed differences in responses by participants grouped by the variables of teaching experience, grade level or number of hours participating in the technology professional development program.

Item-by-item t-tests were performed. Four items were found to be statistically significant in identifying the characteristics of those more likely to be confident when comparing teachers with 1-10 years of teaching experience or those with more than ten years of experience. Table 16 represents those items where statistical significance at the .05 level was found. The mean scores were based upon the selection on a Likert scale ranging from 1 -5.

**Table 16. Technology Confidence relative to Teaching Experience**

	1 – 10 years Teaching Experience (Mean)	>10 years Teaching Experience (Mean)
Use current research to plan	3.36	4.29
Use technology to assess	3.45	4.21
Use technology to analyze data.	3.64	4.50
Promote safe and healthy use	4.18	4.64

These four confidence items were all statistically significant favoring veteran teachers with more than 10 years of teaching experience to those with less than 10 years of teaching

experience. Teachers with more experience were more likely to use current research when planning for technology integration. The average rating for teachers with 1-10 years of experience was 3.36 compared to 4.29 for teachers with more than ten years of experience. Teachers with more experience were more likely to use technology in assessing student learning. Teachers with 1-10 years of experience had an average score of 3.45 compared to 4.21 for teachers with more than ten years of experience. Of the 27 survey respondents for this question, 21 of them agreed with this statement, 4 had no opinion, and only two disagreed, indicating that most teachers are using assessment tools available through the District's web resources. All participants agreed that they promote the safe and healthy use of technology resources. The teachers with more than ten years of experience were more likely to strongly agree with this statement than those with 1-10 years of teaching experience. Survey results suggest that teachers felt they maintained the safe and healthy use of technology within their classrooms. In fact, all but one participant who answered this question on the survey agreed with this statement (13 participants selected "Strongly Agree" and 13 selected "Agree," found in Table 16).

These confidence indicators are in line with the District goals and objectives as well. One of the District's five goals is focused on implementing technology with students. Yet, most years within the technology professional development program were supportive of a teacher's use of technology. It wasn't until later years (phase three, 2001 – 2004) that the technology professional development program began to focus on student use of technology in support of learning.

Items rated with Agree or Strongly Agree by most participants provided a measure of confidence in using technology. Table 17 indicates the five statements earning the highest overall total points (in descending order). Table 18 presents the five statements earning the lowest overall points (in ascending order). These items were chosen the least, suggesting less confidence in these areas. It is important for principals and those people in charge of planning for technology professional development to address these bottom indicators of confidence with technology. Of special note are the items of least confidence, which suggests a lack of confidence when using and talking about technology with one's peers. Another important finding is that the knowledge of technology standards and the application of those standards when planning were also less likely to be chosen. The fifth category, technology

improves reading and writing, is also important. The District administrators, and those facilitating training within the district, need to keep this in mind when planning for technology professional development. This indicates teachers are not all in agreement that technology is helpful. The implications of the findings showing the areas of high and low confidence will be presented in Chapter Five.

**Table 17. Top Five Technology Confidence Indicators**

<b>Survey Item</b>	<b>Number of Times Chosen (weighted using Likert scaled points)</b>
Promote use with students.	120
Like to teach.	116
Teaching with technology enjoyable.	115
Plan for the management.	114
Evaluate technology resources	113

**Table 18. Bottom Technology Confidence Indicators**

<b>Survey Item</b>	<b>Number of Times Chosen (weighted using Likert scaled points)</b>
Aware and apply technology standards	101
Technology improves reading & writing	100
Confident about technology with peers	96
Train others	94
Leader in technology	93

#### Additional Influences on Technology Use

In question eight of the survey, participants were asked to report about other influences on their use of technology. Participants could check all choices that apply from a predetermined list, including an "Other" category to encompass influences that did not fit within the predetermined choices. Teachers responded that their own curiosity and motivation to pursue further knowledge had a great influence on their use of technology. Table 19 indicates which factors outside the professional development program influenced the use of technology by these 27 participants.

These selected categories were tied with a teacher's likelihood to feel confident using technology as well. There was a strong connection with a teacher's own curiosity and technology confidence score. Twenty-three respondents evenly distributed between elementary and middle school levels reported that curiosity influenced their choice to use technology.

**Table 19. Factors Influencing Use of Technology**

Survey Item	Number of Times Chosen
Own curiosity	23
Mentoring/coaching	18
Outside training or experiences	13
Other content area training	12
Other	3

### Section Three

Section Three of the survey, Site Implementation, was designed to determine the things that facilitated or impeded the implementation of skills and strategies learned during technology professional development. The implementation of technology within the classroom lies at the heart of this professional development program. Participants were asked to reflect on the frequency of student technology use. This section of the survey asked teachers to quantify how often their students are engaged in particular technology uses. Responses were organized around an ordinal scale that ranged from Every day (5) to Never (1).

#### Perceived Effects on Students

In order for teachers to quantify student technology use, performance indicators from the National Educational Technology Standards for Students (NETS-S) third through fifth grade profiles were selected to represent the over-arching themes of the six broad categories within the student technology standards (ISTE, 2003). These categories are:

1. Basic operations and concepts.
2. Social, ethical, and human issues.
3. Technology productivity tools.
4. Technology communications tools.
5. Technology research tools.
6. Technology problem-solving and decision-making tools.

Only 20 of the teachers responded to this section of the online survey. This might indicate that it was difficult to put responses into these categories, even though the NETS for students were an integral part of the technology professional development training sessions.

Table 20 shows the types of technology use students were engaged in and to what degree as reported by teacher participants.



**Table 20. Frequency of Student Technology Use**

How often (per week) are your students engaged with educational technology for each of the following purposes? (These are based on ISTE - NETS for Students Profiles)						
	Every Day	Frequent	Often	On Occasion	Never	Response Average
Use common devices.	16	3	1	0	0	4.75
Discuss common uses.	2	6	4	6	2	3
Responsible use.	4	4	4	7	1	3.15
Use productivity tools.	5	3	6	3	2	3.32
Collaborative activities.	3	3	4	6	3	2.84
Access info & communicate	0	4	4	3	8	2.21
Participate in collaborative problem-solving activities.	1	3	4	4	8	2.25
Self-directed & extending learning.	4	1	7	7	0	3.11
Select appropriate resources to address a variety of tasks.	1	4	5	9	1	2.75
Evaluate electronic information sources.	2	1	3	10	4	2.35
Total respondents = 20						

Teacher responses demonstrate most common student uses of technology are low-level activities (as categorized by the NETS for students). Students are most often engaged in using technology as a productivity tool and in basic ways, and the third most common response was students using technology responsibly, within the social, ethical and human issues category. Teacher responses illustrate students are engaged least in using technology for communication, research, problem-solving and decision-making. Students don't engage in collaborative problem-solving activities very often, and the third least often chosen response was evaluating technology resources.

It appears to be somewhat common for students to use productivity tools and peripherals. This is in direct contrast to the results from question 15H – the use of technology resources for problem solving, self-directed learning, and extended learning activities. Further substantiating the lower level uses of technology rather than the higher-order thinking skills demanded in problem-solving activities.

From these choices, teachers were then asked to select the three they felt were the most significant factors for student achievement. Table 21 shows the overview of those items respondents felt had the most significant impact on student achievement. The item with the most responses, 11 total, was "Use technology resources (e.g., calculators, data collection

probes, videos, educational software) for problem solving, self-directed learning, and extended learning activities.” Yet, this was not an area that teachers noted they had their students engaged in every day, nor is it currently one of the Board goals. There were three items with a total of 7 responses:

- Use keyboards and other common input and output devices.
- Use technology tools (e.g., multimedia authoring, presentation, Web tools, digital cameras, scanners) for individual and collaborative writing, communication, and publishing activities.
- Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources.

**Table 21. Significant Effect on Student Achievement**

From the following list, select 3 that you feel have the most significant effect on student achievement and rank order those three items only.				
	Most Important	Important	Fairly Important	Total Responses
Use common devices.	3	3	1	7
Discuss common uses.	0	0	0	0
Responsible use.	0	0	3	3
Use productivity tools.	3	2	0	5
Collaborative activities.	2	3	2	7
Access info & communicate	0	1	0	1
Participate in collaborative problem-solving activities.	0	2	2	4
Self-directed & extending learning.	3	4	4	11
Select appropriate resources to address a variety of tasks.	2	2	1	5
Evaluate electronic information sources.	4	0	3	7
Total responses = 18				

Of these responses, the first was a common use by students, but the other two were not activities that students engaged in every day. Yet, by the teachers' responses, they were the types of activities that were most important for student achievement. And, the item chosen by teachers, as the most important to student achievement was item H, students using technology resources (e.g., calculators, data collection probes, videos, educational software)

for problem solving, self-directed learning, and extended learning activities, yet, very few teachers are engaging students in this type of technology use (only 4 respondents said their students engaged in this every day).

### **SITE ADMINISTRATOR INTERVIEWS**

Data was also gathered from principal interviews and sheds more light on the concepts of confidence using technology, additional influences on technology use, and the perceived effects of technology use on student achievement. The researcher conducted interviews with the site administrators to illuminate the results from the online survey. The three concepts – technology confidence, additional influences on technology use, and effects on students - that appeared through the data reporting from the online survey, are also supported in the data from the interviews with the site administrators.

### **Confidence Using Technology**

Site administrators too recognize that technology confidence is much higher today than before the District began this reform process. This is detected in the many statements made by the principals during the interviews. Site administrators provided 259 examples of technology use within the classrooms. The average number of examples per school was 32 (28.5 for the elementary schools, and an average of 44 examples at the middle schools). The number of examples that site administrators can cite suggests technology is in use at all levels and frequently. Of these examples, one comment by an elementary principal stands out:

Automatically in the morning they flip their computers on and they have a web page come up... It may be the teacher's web page with the daily assignments on there. They can click a link and automatically go to where she wanted them to be looking at some information, gathering information and doing something with it.

This site administrator saw the use of technology incorporated into some classrooms within the daily routines. Of the 259 classroom examples of technology use, 23 were specifically teacher use of technology. Another principal noted the following example:

They use wireless tablets and write on the tablets for the kids to see or they hand it to a student and the student's writing goes on the display in the front of the room.

When listening and reviewing the site administrator interview transcripts, the Project Director was excited to hear these comments. She observed, “I’m so happy to hear them say this! This is what we want, teachers and kids using the technology.”

### **Additional Influences on Technology Use**

In the site administrator interviews, several outside influences were noted that further enlightened the categories from the online surveys. The following codes, based upon the online surveys, were applied to analyze the interviews:

- Administrator support
- Coaching or mentoring by peers
- District support
- Email, Chat, or Blog support
- Grade level support
- Just-in-time support
- Planning support
- Sharing resources
- Tech. support

Site administrators were able to give examples of outside supports based on their experiences. The top three areas of support noted were: sharing resources, just-in-time support, and administrator support. Table 22 gives the numerical breakdown for these codes.

**Table 22. Additional Influences on Teacher Technology Use – Administrator Perspective**

<b>Influence</b>	<b>Frequency of Response</b>	<b>Percentage of Respondents</b>
Administrator support	19	20.9%
Coaching or mentoring by peers	11	12.1%
District support	7	7.7%
Grade level support	1	1%
Just-in-time support	20	22%
Planning support	7	7.7%
Sharing resources	22	24.2%
Tech. support	4	4.4%
<b>Total:</b>	<b>91</b>	<b>100%</b>

Of course principals can talk about their perceptions of the support they are giving their teachers. Principals all stated that they create planning opportunities for teachers. They

all shared their plans for the District mandated monthly technology integration afternoon. And most said they lead this meeting with the aid of the Tech. Core teachers.

The other two areas, sharing resources and just-in-time support, deserve a closer look. The examples of sharing resources given by the site administrators were mostly about opportunities for teachers to come together and share what they are doing with technology. One elementary principal shared the following example:

I think probably one of the best ways that I help staff to continue getting more involved, is just helping create the connections between staff that promotes their being involved, like when teachers have a lot of trouble, making sure I pair them with somebody who can show them ways of making things a lot easier. And finding ways of making sure the teachers who have great ideas get that information and share it out with the entire staff.

And, another principal shared this example:

My first grade team did a tour of the classrooms with technology in the District and came back. We had some real good discussion about what they saw that would work and what they saw that wouldn't work. Ultimately they said, "We would really like to start individual web sites for each of our kids, but we can't do it with just one curriculum integration a month. We need more time. Is there a way you can make that happen?" ... So I cut a deal with them where I would pay each of those first grade teachers an extra eight hours of time to work on it after school.

The Tech. Core gives the just-in-time support. They are available to teachers working on specific projects each week after school. One principal described the Tech. Core weekly office hours this way:

... A group of site experts, you might call them, who really are providing more training in order to be of assistance and to help teachers to be able to implement the different kinds of things that they are doing. They usually will meet every Monday ... to provide opportunities for teachers to come down and gather together and meet with our Tech. Core leader and be able to work on a number of different areas."

Another principal shared this description of the Tech. Core teachers:

They are the problem solvers. My teachers know that if they have difficulty with a particular program or if there's ... an equipment problem or whatever, they know that they are the first line of defense...

Finally, and most significantly, site administrators range in their abilities to support the integration of technology within classrooms. Most simply offer the time for the teachers to get together and share their work. One administrator is instrumental in leading the integration and modeling what is expected.

And one of the things that I did was to say to the teachers, "I'm asking you to create a classroom website using Front Page, and I also need to create a website." So I created the school website last year and our deadlines were the same. We created a similar deadline so the same day that I shared the new school website with teachers, they shared their classroom website with staff at a staff meeting.

As Thomas and Knezek noted (2002), this type of support and modeling by a principal is not common. In fact, ISTE has developed two other documents directly related to helping administrators to support integration of technology, NETS-A, standards for administrators, similar to the NETS for teachers and students, and Essential Conditions for Implementing NETS for Administrators, a document outlining the conditions that must be considered when planning for technology integration and a technology-rich classroom environment.

### **Perceived Effects on Students**

The perceived effects on students from the administrator interviews fell into two broad categories: (1) general comments about classroom applications and/or student uses, and (2) a greater need to support instruction through the use of the district assessment system.

#### **Classroom Applications & Student Uses**

The site administrators cited general feelings about how they observed more highly developed skills and higher order thinking in their students. One elementary principal noted the following important factors when assessing the impact technology is having on his students:

It's the collaboration. It's the working together and problem solving together. It's the research out on the web and trying to problem solve what it is they're looking for and going and finding those things and then making sure that they are able to look at, and prioritize what is important information and what is not important information.

Another principal at the elementary level shared the following example of students evaluating information and resources found on the Internet:

The children were discovering things for a particular theme like photosynthesis. There are over a million sites that you can go to. They were absolutely astounded that there was that much information available, and they talked about how to identify whether it was good information, bad information, and how do you validate your sources.

#### **Technology Supporting Assessment**

The site administrators shared about the need to move forward using technology to support assessment. This was one area where the administrators and teachers differed. The administrators all shared that this was an area of need for future professional development, while teachers felt they were already using technology to support assessment and that the next steps should be to further support sharing of resources.

One principal mentioned, “The next step in our reform effort really is to better use the instructional data management system, to drive our decision-making about instruction, and the delivery of instruction in the classroom, based on student data.”

Only one elementary principal pointed out the following benefit of technology in analyzing student data to support teacher instructional planning that he felt was currently in place.

We have all of the IDMS work where all of the test scores are and then the assessments that we do along the way are recorded as well [sic]. It's all put in, teachers feed it into the computer and then they can sort it and spit it out in different ways, to help us do planning. Because, again, our plans have to be based on the student needs, and in order to identify student needs, we need a little bit more than what the teacher thinks this is what the child needs. We have some good test data. It's easy to get to, and so our plans could be based on some really good information, and the computer has made that part much easier.

## **FOCUS GROUP INTERVIEWS**

Additional information was gathered through focus group interviews. Teachers in the focus group ranged in how confident they felt using technology. They shared in length about the ways they would like to share resources and support each other. And, they described many instances where technology was a factor in student achievement and motivation.

### **Confidence Using Technology**

The teachers varied in their self-proclaimed technology confidence, although most total scores were high. Total technology confidence scores ranged from 52 – 100, with the average total score of 79. One teacher started with this description of herself:

I'm doing more of a hit and miss with the technology. I'm just kind of plugging in the gaps in student prior knowledge right now. I'm using United Streaming to give them background before we start in on a new concept or unit, then using Google images to give them images of things as we're going through the unit. So I feel like I'm kind of filling in holes with technology this year.

Another teacher introduced herself this way, “I am your reluctant integrator because I had no idea how to use the computer.” She quickly explained that she has been working to overcome this ever since the reform took hold after the first pilot year.

Not all of the teachers in the focus groups were self-deprecating. Most of the teachers talked about taking on a leadership role in the District once this reform began. They cited a variety of reasons, from wanting computers in their classrooms, to not wanting to be left behind by a planning partner.

I was teaching at the middle school at the time, 6th grade, and my partner was very involved in technology and was really excited about the opportunity. So I volunteered to join the next group so we could keep working together.

Overall, the teachers were very positive and offered many examples of using technology in their classrooms, specifically in literacy. When asked to talk about a recent experience using technology to build student literacy, teachers in the focus group cited many instances. Table 23 summarizes the quantifiable information from the interview data.

**Table 23. Classroom Technology Examples**

<b>Example of Technology Use</b>	<b>Frequency of Response</b>	<b>Percentage of Respondents</b>
Internet	12	17.1%
Language Arts	12	17.1%
PowerPoint	7	10%
Science	6	8.6%
Social Studies	6	8.6%
Collaboration	5	7.1%
Differentiated Learning	4	5.7%
Motivation	4	5.7%
Research	4	5.7%
Cross-Curricular	3	4.3%
Multimedia/Background Knowledge	2	2.9%
Software Support	2	2.9%
Word Processing	2	2.9%
Role Playing	1	1.4%
<b>Total:</b>	<b>70</b>	<b>100%</b>

The teachers’ student literacy examples ranged from basic uses like that of an automated worksheet for studying vocabulary words to much more advanced uses like those of collaborating on projects and creating presentations using PowerPoint® software.



Interesting to note was the finding that teachers. Interesting to note was the following comment by one teacher regarding how technology motivates student in rote learning tasks.

Using one graphic organizer in Kidspiration®, I take the vocabulary words we're working on with our story in our Houghton-Mifflin series and type them in. Then, there's a place for them to put the definition, put the word in a sentence and then they can add a picture there that helps remind them of the word. I've found that they remember the words and they think they're having fun... Even the ones that didn't want to do it with paper and pencil are eager to do it on the computer.

There were also many examples of technology use in classrooms that crossed many curricular lines. Most of the seventy literacy examples given during the focus group interviews relate in one way or another to the California state standards for English-Language Arts in reading, writing, listening, and speaking. The teachers are well aware of this and their definition of literacy expands beyond the boundaries set within those standards. The teachers mentioned linking different activities to those standards on their classroom websites and within many areas of the curriculum. The teachers also stated that they appreciated the ability to make learning objectives very clear to the students when developing activities linked on their websites. The following quote demonstrates the teacher's awareness of state English-Language Arts standards and how she incorporated them into the social studies curriculum.

We are in Citrus Heights and one of the social studies standards focuses on your local history and your community history. There is not a textbook that I'm aware of that does a unit on Citrus Heights history, so we're pretty much designing our own curriculum. I made a PowerPoint that took all of the information from a local historical society, Citrus Heights Historical Society, materials that other teachers have collected over the years and photos that have been scanned in showing kids in school back in the early 1900's and showing Citrus Heights before anything was ever built. I also used the Hot Potatoes software to build little quizzes and crossword puzzles into the PowerPoint so that I could check their comprehension as they go along reading through the presentation and answering questions. After that I tied it in with our Language Arts writing standards and the kids wrote a story about a person that's living 100 years ago. They included what their life was like growing up, some school experiences, and some put in photos or pictures they drew by hand and scanned in or from the computer software we use. Finally, they put that onto their website, integrating all of these curricular areas and standards in social studies, developing writing, editing, and revising, and presentation skills.

This particular example occurred in a classroom with the 1:1 computer pilot program. The students were so excited by this project that they shared their computers in order to

succeed on the quizzes and crossword puzzles. One student had the computer open to the presentation and the other had the quiz. They would go between the two computers to supplement their understanding, reread, and build their knowledge about the subject matter. Suggesting again that the technology fosters an intrinsic motivation in students not commonly found with traditional research and report writing.

### **Additional Influences on Technology Use**

Teachers in the focus group noted many of the same outside influences on their technology use as those that appeared through the site administrator interviews. Not surprisingly, the number one influence outside of the technology professional development program that is substantiated through the themes that emerged from the previous discussion of the technology professional development reform was coaching and mentoring by peers. Instances of co-planning and visiting other teachers' classrooms abound in the focus group interview data. The second and third influences that appeared were the sharing of resources and tech. support. Again, with the collaborative efforts and structures within the District, it is not surprising that teachers would report about the sharing of resources and helping each other out when technology support is needed. Table 24 summarizes the coding of the focus group interviews.

**Table 24. Additional Influences on Teacher Technology Use – Teacher Perspective**

<b>Influence</b>	<b>Frequency of Response</b>	<b>Percentage of Respondents</b>
Administrator support	4	6.1%
Coaching or mentoring by peers	15	22.6%
District support	7	10.6%
Grade level support	7	10.6%
Just-in-time support	4	6.1%
Planning support	7	10.6%
Sharing resources	11	16.7%
Tech. support	11	16.7%
<b>Total:</b>	<b>66</b>	<b>100%</b>

These teachers shared their how they spent more time on other teachers' issues and felt that they were missing out on having someone else influence their use of technology. One teacher did mention an example of how he works with one other teacher, "Another teacher and I are always there early in the morning... He's got a lot of ideas and I tend to be

the one who's able to work them out for the website stuff." This might indicate some short sightedness on the part of the Tech. Core. It is understandable that they would want more support themselves, but possibly they've lost sight of how helping someone else deepens one's own knowledge about the subject.

When asked about the opportunities to collaborate with other teachers, another teacher commented on her frustration with always having to support others.

I spend 95% of my prep time fixing other people's problems, so in that regards, I don't know if I really get it.

Yet, others are eager to share and gain a great deal from interactions with other teachers. One teacher noted how sharing resources has impacted her technology use.

I received an e-mail from a reading specialist and she said, "Well, check out this guy's website." I checked it out and it was perfect for one of my students. He's at a very low reading level. I've tried several other things with him that just haven't been successful. He's been a reading recovery student. He's worked with our literacy coach. Not a lot of things are clicking for him, so its kind of another attempt to bring him along quickly.

Support within the District for planning collaboratively has changed over time due to the flux in federal and state educational funding. Teachers felt that the earlier phases of the reform were the most supportive of getting teachers together for collaborative efforts. One elementary teacher shared this:

We were given an awful lot of time early on. This is when they had the grant money. Not so much now, but early on we were given hours and hours where we could sit and we were given so much freedom to plan the things that were important to us as a grade level and to fill the needs in our curriculum.

Her planning partner concurred:

Since the grant has run out, it's been more helping each other and out here swimming in circles a bit. I would like to see the next big step to be sharing across every grade level in the District. I know that there are 5th grade teachers in this district that have some phenomenal stuff going on and I don't know about it, so I'm out there reinventing the wheel at 5th grade... We have to reorganize our district's website so that there is a place where 5th grade teachers can e-mail each other, go to a chat room, and post blogs.

The Project Director commented on this same phenomenon when editing portions of this manuscript. "The Tech. Core meets twice monthly in order to stay a hair's breadth ahead of the rest."

And a third grade teacher added:

I still feel it's a big huge world of 2 people and that's pretty limited and we would be far better off if we could meet with other teachers in the district and see how they're handling the weather unit or the Explorers and what's going on with their classrooms.

### **Perceived Effects on Students**

It doesn't appear from the survey data that teachers are incorporating technology in the ways they say are most significant. Yet, during the focus group interviews, teachers' descriptions of the work students were doing falls into the categories of technology use teachers cited as most significant in supporting student achievement. For example, a fifth grade teacher described a recent project her students were working on:

We tie in the Social Studies and the students do a PowerPoint on a Social Studies subject and that's real effective. They're learning to take notes and summarize because you can't get complete sentences on a PowerPoint that can be seen from great distances, so it really forces key words and phrases and at 5th grade they need that. The PowerPoint then allows them to add the visuals and all of the fun stuff so that a lot of students who still have trouble managing neatness and appearance of work are able to, by PowerPoint, really become effective in their communication and presentation skills.

Another example from a third grade teacher shows how teachers are embedding assessment and the use of research altogether within their units of study.

The students have an assignment to get certain key pieces of information off of each different person's website that I link to my classroom website. They take notes on those topics and the information they gather. Then they have to summarize to create a PowerPoint on one specific science topic. So even though it's embedded in science content they're also learning to hone their literacy skills. Finally, they create their own crossword puzzles, complete with clues, and word searches for each student to complete online. This way I can evaluate their science content knowledge and their literacy skills through these multiple tasks.

Teachers were linking their websites to the sites they wanted children to visit in order to develop thinking on an issue or topic. They did this after evaluating the sites for ease of student use, accuracy of data and relevance to the projects they developed within their curriculum.

One teacher describes how her teaching crosses over many resources and was relevant to her students:

[The students] were designing and deciding on a location, in pairs, of where they would like to take a winter vacation and they had to collect weather data every

day on that location, so they had to go on a couple or three websites because none of them had all the data that they were looking for. Not one carried every piece of weather data.

In the meantime, I'm teaching weather, weather instruments, storm fronts, how to read weather maps and predict future weather, so they were taking science and then they were doing technology research to find out what was going on in the area that they thought would be the best for a vacation and then, as a result of that, they designed a very simple brochure, which would take you into Microsoft Word, where they would talk about what you should bring if you're going on this trip and where you should stay, so they had to go into those locations and look up what hotels and motels and campsites and whatever would be appropriate that would be available and activities and what things you would need to pack and bring to be appropriate.

Teachers shared how their students are directed to the class webpage upon entering the classroom. Students find the initial questions to guide their learning for the day on this webpage, along with rubrics for the projects students will complete. The teachers use this as a springboard to student learning, assisted by links to websites that support the curriculum. Teachers report that this structure has made them student-focused, less apt to be center-stage (Marzano, 1992; Weimer, 2002). The following is an example of one such project from an elementary classroom:

They had the role of the climatologist and the biologist and... they had to collect data about a certain job on their own using the multiple websites from my class webpage... That's how I like to do it, where they try to take on the problem from a real perspective of a scientist in the field.

## **SUMMARY**

Teacher technology confidence is high within this district. Teachers reported that they dedicated more class time to the overall use of computers and related technologies. Many teachers began this reform by scheduling students to use the computer in a rotating fashion, which often lead to student game playing due to the lack of connection between the classroom objectives and the use of the computer. Yet, that use has grown incorporating more student-centered and relevant projects, engaging the students in higher-level thinking skills noted as being important for student achievement. At the time of this research, teachers were assigning more authentic projects for students to complete using the technologies now available within the District. The application of problem-solving and collaboration to complete projects appears to be linked to teachers' knowledge of state standards and their own shift in beliefs about how technology can impact student achievement.

Teachers noted that their own curiosity led them to pursue additional information and influenced their use of technology for themselves and with their students. Many technology uses were incorporated due to a teacher wanting to problem-solve a situation for an individual student who was having difficulties, or just for increasing their own knowledge because they didn't get enough support because they were the leaders already.

Teachers also reported using technology to help them track student assessments and progress towards the mastery of state standards. There did not appear to be a tie between technological use within classrooms and the years of teaching experience of the teacher.

### **Sub-Question Two**

In sub-question two - What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development – the purpose was to determine the teachers' perceptions of the factors most significant in supporting their technology implementation. Three data collection techniques were used to address this question – an online survey, focus group interviews, and site administrator interviews.

#### **ONLINE SURVEY**

Section Three of the survey focused on the implementation of technology at the site level. This section provided access to and understanding of those factors that may act to support teachers in their implementation of the instructional strategies learned through the District technology professional development program. Question ten was developed for the survey, in order to better understand what helped teachers to implement what they had learned through the technology professional development program. Question ten asked participants to check all the factors that supported their implementation of the instructional strategies.

Table 25 presents the five statements indicating those factors that supported teacher implementation at the school site (in ascending order). Teachers were clear that they have all of the materials they need in order to teach (82.4%). They also feel they receive adequate support for the technology they use. Finally, the other three factors indicating support for site implementation of technology generally fall into one grouping – focused on the support given from the principal in the form of leadership and feedback. It is important for principals

and those people in charge of planning technology professional development to address these factors that support site implementation of technology.

**Table 25. Top Factors Enabling Site Implementation**

<b>Support Factor</b>	<b>Frequency of Response</b>	<b>Percentage of Respondents</b>
I have access to the necessary instructional materials at my school.	14	82.4%
I receive adequate support for the technology I use.	11	64.7%
My principal's instructional emphasis matches the technology professional development.	10	58.8%
I receive appropriate feedback from my principal and/or other resource staff to support my professional growth using technology.	10	58.8%
The professional development activities available at my school site support my professional growth using and teaching with technology.	10	58.8%

An integral part of the reform in this district is having the necessary instructional materials, including technology resources. Participants considered the availability of materials that would support the implementation of the instructional strategies learned through the technology professional development program. As noted in Table 25, 14 respondents reported they had sufficient materials. Of these respondents, 42.9% were less experienced teachers, while 57.1% were veteran teachers. It makes sense that less experienced teachers would want more materials available to them so that they feel more confident with knew concepts and the art of teaching.

Teachers also noted adequate support for the technology as a support with 11 respondents selecting this factor. This indicates the District is meeting the expectations from the teaching staff for tech. support with the systems in place at the site and district levels.

One area not highlighted as a support for implementation was that of time. Teachers reported time as an area of need, which will be covered more thoroughly in the following section about barriers to implementation.

## SITE ADMINISTRATOR INTERVIEWS

The interviews with the site administrators included a time for the principal to talk about how they are supporting teachers to integrate technology in the curriculum. One prominent area of concern for the principals was the issue of technical support. The potential impact of the technical support within the District is heightened by this principal's narrative response:

I think it's significant in terms of technology integration because here in our District we have really good technical support. We don't wait weeks to get things back up and running. I cruise through classrooms regularly and if I walk in and somebody has some technology that's not working, they're not afraid to share that with me. "[M], these three computers just went down ten minutes ago." "Have you called the tech center yet?" "No." And I pick up the phone and call and usually within a very short period of time they're back online. So pretty impressive technical support, and if teachers are going to integrate technology, they have to know that it's dependable, and that most of the time it's going to be there when you need it."

Site administrators know of the time issue. When comments about time made by administrators were analyzed, it was clear there was a contradiction between the teachers' perceptions about the time issue and the administrators' sense of the issue. One principal shared how she tries to support teachers:

For anybody that's interested, I do some sub time, where they might get like a half day sub, or they share a sub with somebody else, and they get a couple of hours to actually sit down and work. Because they say, "I don't have enough time to do it, I don't have enough time to do it." So we say, "Okay, we'll give you some time."

And another administrator had this to say about how teachers need to allocate different tasks within the given time frame for prep time:

It's not an easy thing for them to do, because time is very limited, and you kind of have to look at your prep time each day before school and after school, and adding prep time for technology. It can't just be the way that we most commonly think of prep time, grading papers, looking at the next days' activity...now we need to also build in your technology.

Yet, teachers felt supported by their site administrators as noted in the positive survey results for supports teachers selected. One administrator gave an example of how she approaches feedback and evaluation of teachers on implementing technology:

As part of the evaluation process, I look at websites. And, rather than commenting on what needs to be there, what I'm looking for is incremental growth, because some are clearly ahead of others. I feel it's just beneficial to measure a teacher's growth.



Another administrator commented on how she utilizes staff meetings to support technology integration:

Once a month we meet in staff meetings for about an hour and fifteen minutes to look at different ways of using technology, and it's called a curriculum integration meeting. I have the Tech. Core try to bring in different things to share with teachers at the school. For example, how to use Power School, how to use the instructional data management system, how to hyperlink on their website, good resources for them to use, and addressing how they can better use technology in their classroom

The support felt by teachers is mirrored in the site administrators' comments and examples of how they are supporting the integration of technology at their sites.

### **FOCUS GROUP INTERVIEWS**

Focus group interview protocol (Appendix C) included a time for teachers to talk about what has supported their integration of technology. The feeling of support from having plenty of instructional materials found in the survey data was paralleled in the focus group interview data. One teacher spoke of sharing resources around the District.

"We went in as a team, a 6th grade team. We share in this district more than any other district probably in the United States, sharing materials. If I make something, I email it to every elementary school teacher in the school district. If I don't know something, if I can't find something, I know she can or I know he can and we will e-mail each other and ask each other, you know, "Is there a good site for Math tests. Is there a cool site for this science lesson?" And we keep each other in the know and we do a ton of sharing."

During the focus group interview, one teacher shared this enthusiasm for support she knew she could count on:

"With the tech core group, we had a person at our site that would set aside, Tuesdays or something like that, in the afternoon, so we could come and work in his room. You know he set aside an hour, but if he had the time, you could stay there an hour and a half or two and he would be there to help you if you hit any bumps in the road."

And another teacher shared this narrative about the support throughout the District:

It isn't what you know about computers and technology that makes you a good teacher at integrating it in your classroom. It's who you know and the ability in this district to go to any teacher at any level and say, "Help me with this." I have never had anybody say, "I'm too busy. I can't." It's the whole atmosphere of our district, which is, we're here for each other and any time I have a problem, I know I can go to someone and if I go to enough people, someone's gonna have an answer for me and help me out.

A final comment about the support available in the district came from a middle school teacher.

I think the biggest support is just the amount of people that are doing different things and that have different ideas to share. I think that's the biggest support for me, and the fact that you can actually do it because it's there and available whenever. You don't have to get stuck at school, but can access your files from home at any time of day.

Teachers and administrators alike were quite positive when it came time to discuss the things that supported the implementation of technology. Teachers reported that they had access to the necessary instructional materials and tech support. They noted support from principals and feedback as well. And, they suggested the professional development opportunities at the school sites were a support also. The focus group interviews highlighted peer support as a major factor influencing teachers' use of technology, and data from the site administrator interviews suggest the same to be true.

### **Sub-Question Three**

The purpose of sub-question three – what barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program – was to determine the main factors that get in the way of teachers incorporating new learning into their daily jobs. The Site Implementation section of the online survey, and the interviews with both site administrators and the focus group, provided access to and understanding of those factors that may act to impede teachers in their implementation of the instructional strategies learned through the District technology professional development program.

### **ONLINE SURVEY**

Question twelve asked participants to check all the factors that kept them from implementing the instructional strategies.

Table 26 presents the five statements indicating those factors that kept teachers from implementing technology at the school site (in descending order). Of special note is the fact that one barrier far outweighed the others in teachers' minds as impacting their integration of technology – time. Fifteen participants (83%) felt that they do not have sufficient time to plan for and integrate technology. The next closest barrier noted by teachers on the survey was

also related to time – the required testing and assessments take too much time away from teaching with technology; 10 participants (55.6%) selected this factor.

**Table 26. Factors that Impeded Technology Integration**

<b>Impediment</b>	<b>Frequency of Response</b>	<b>Percentage of Respondents</b>
I do not have sufficient time to plan for technology integration and/or implementation.	15	83%
Required testing and assessments take too much time away from teaching with technology.	10	55.6%

It was hypothesized that teaching experience would have an affect on how teachers perceived the barriers they faced. For statistical analysis, a Chi-Square test was used to determine if teaching experience has an impact on the barriers chosen by the participants. Table 27 represents the items chosen by respondents based on teaching experience. Time for planning and the impact of testing on instructional time were the two main barriers cited by participants. Although teachers with more experience appeared to be more willing to comment on the barriers they face, more startling was the implication that teachers are, perhaps, overwhelmed by the new technologies and need additional support in dealing with time constraints and planning support to diminish these barriers.

The theme of insufficient time reverberates across the state, in fact, across the teaching profession (Moore & Page, 2002; Robb, 2000). It is not surprising the survey respondents reported this factor most often as an impediment to their implementation of technology integration. New teachers are working diligently to harness their knowledge of many areas – student needs, content areas, instructional strategies, time management, planning, etc. It would not be uncommon to visit a lunchroom and hear teachers wishing for more time.

The other barrier mentioned in the survey responses was the impact testing and assessments have on instructional time. Veteran teachers found this more of a challenge, 6 teachers with more than ten years of experience chose this factor compared to four teachers with 1-10 years of experience choosing this item.

**Table 27. Chi-Square of Barriers by Teaching Experience**

<b>Impediment to Implementation</b>	<b>1-10 Years Teaching</b>	<b>Over 10 Years Teaching</b>	<b>Total # of Times Chosen</b>
A. I do not have access to the necessary instructional materials at my school.	1 100%	0	1
B. The instructional strategies from the technology professional development do not match my style of teaching.	3 75%	1 25%	4
C. My principal supports a different instructional model.	0	0	0
D. The featured instructional strategies were too advanced for my students or for myself.	1 50%	1 50%	2
E. The featured instructional strategies were too easy for my students or for myself.	0	0	0
F. I do not have sufficient time to plan for technology integration and/or implementation.	8 53.3%	7 46.7%	15
G. Required testing and assessments take too much time away from teaching with technology.	4 40%	6 60%	10
G. My students are academically higher than those shared in the technology professional development.	0	0	0
H. My students are academically lower than those used in the examples given in the technology professional development.	0	0	0
I. My students are more diverse than those as examples in the technology professional development.	2 100%	0	2
J. My students are less diverse than those examples given in the technology professional development.	3 100%	0	3
K. The technology is not available to me.	0	0	0
L. Other (please specify)	3 50%	3 50%	6

A number of respondents, approximately one-third of those responding to this particular survey question, offered written comments about the barriers they faced. The problems point to technical glitches that compromise instruction, teacher trainers who are possibly overworked and lacking the opportunity to grow their own skills, and perhaps, an

inability to prioritize initiatives, which can, potentially, diminish innovation and risk-taking. While the overall response rate was small, the frustrations are noted:

- “Problems with technology being consistently working.”
- “My Averkey [PC/Mac to TV media converter] cannot be used on my TV so whole group instruction is challenging!”
- “I often train teachers so I don't have the opportunities to learn anything new, or be exposed to ideas beyond my imagination.”
- “Network problems, program bugs, and like frustrations.”
- “We are trying to implement too many technological advances simultaneously. It's impossible!”

Teachers who had been teaching for at least eight years offered all of the above negative comments. Of these respondents, three were third grade teachers and two were sixth grade teachers. These grade-specific responses raise questions about the latest technology program within the District, EETT, where teachers in the third and sixth grades have been piloting 1-1 computing and the impact of this program on the perceived value of that program. The implied meaning is that teachers are feeling overwhelmed by the demands of new technologies and some support system might need to be put into place to deal with those issues.

Only one difference in teaching experience was noted. One hundred percent of respondents selecting items regarding the students (for example, item H, “My students are academically lower than those used in the examples given in the technology professional development.” or item I, “My students are more diverse than those as examples in the technology professional development”) were teachers with 1-10 years of experience. Of these respondents, only one was new to the profession with only 1-3 years of experience. The rest of the respondents had been in the profession for 8-10 years.

## **SITE ADMINISTRATOR INTERVIEWS**

The surprise in this data was in the inverse administrator interview data. Only one administrator noted that teachers do not have enough time to reflect on their practice and plan for more technology-rich lessons and student projects.

One other administrator noted the times teachers have available for planning:

“Right now the teachers have a half an hour before school, and 15 minutes after school as their prep time, because we're an elementary school. So it's not like a

middle school where they have a period that's their prep time in the schedule every day. But, this year we ran a 10-week fine arts rotation program with ArtsBridge, and during that 2 hour period while children were learning fine arts with real fine artists, teachers were released to plan together and within their cohort.”

Site administrators noted funding as a greater barrier to technology implementation. This makes sense when looking at the job responsibilities of the person responding. Principals are responsible for budgets. They would clearly see the impact of technology on the money available.

### **FOCUS GROUP INTERVIEWS**

Conversely, the barrier of time was mentioned eleven times during the focus group interviews and funding was mentioned only in relation to time for planning. Interaction with colleagues was another surprising barrier that was repeated throughout the focus group interview. The teachers shared many examples of being frustrated with someone who keeps drawing attention away from the District goals and objectives of implementing technology. One teacher shared this example:

I get stuck with all the people who just always at the same place. They ask the same questions like, "How do I hyperlink this?" or "How do I do that?" So you know it's just, I feel like I fix more people's problems than anything at those meetings. Certainly more than I get stuff out of them.

One of the elementary teachers agreed, "I kind of feel like the past 5 years I've stayed at the same level because I spend all of my time helping everyone else and there isn't anyone way ahead of me to bring me along.

### **SUMMARY**

In summary, time was consistently noted as the biggest barrier to teachers implementing technology into their curriculum. The other notable barrier was the impact that testing and assessment have on teaching time. These two obstacles are commonly found throughout the state and within the industry of education. It is not surprising that these teachers have the same issues. Although barriers are an issue for educational reform, we turn now to investigate the ways teachers are able to collaborate and work collegially.

### Sub-Question Four

The purpose of sub-question four - what differences were noted in the characteristics of collegiality and/or collaboration between teachers – was to garner insight into how teachers perceived their level of input into both site implementation and the District technology professional development. The fourth section of the survey, titled Collaboration, provided access to and understanding of those areas in which teachers felt they had opportunity for input. Again, the data collected fell into three categories – online survey, site administrator interviews, and focus group interviews.

#### ONLINE SURVEY

Participants were asked to check all items they perceived as areas in which they have had input or the opportunity for input. Frequencies were run in order to determine those areas teachers felt that had the most input. Table 28 represents the items chosen by respondents (descending order).

**Table 28. Collaborative Input**

<b>Areas of Input</b>	<b>Frequency of Response</b>	<b>Percentage of Respondents</b>
Implementation of technology in your own classroom.	16	84.2%
Talking with grade level colleagues.	14	73.7%
Taking an active role in site implementation of technology.	9	47.7%
Giving suggestions for site staff development.	9	47.7%
Helping others integrating technology through observations, coaching, etc.	9	47.7%
Evaluating district staff development.	6	31.6%
Follow-up sessions to district staff development.	6	31.6%
Suggestions for future district staff development planning.	5	26.3%

It is not surprising that teachers felt they had the most input into the implementation of technology within their own classrooms. Surprising responses came from six (31.6%) of the survey participants. This group selected all of the possible areas of input, with all but one of these respondents having taught for more than ten years. This phenomenon might be

attributed to people feeling comfortable enough to take a risk and offer reflections or suggestions to improve things for the greater good.

### **SITE ADMINISTRATOR INTERVIEWS**

From the online survey data and the following comment, one could assume that the professional development program has enlisted many people as trainers and developed the program with them over time and therefore more feel at home offering suggestions and input. One administrator stated the following observation:

We are engaging in professional conversations about student learning and about teaching in classrooms. More than ever before! And on where we need to go in order to differentiate instruction for children right at their zone of proximal development.

### **FOCUS GROUP INTERVIEWS**

A Tech. Core member added the following during a focus group interview:

It isn't what you know about computers and technology that makes you a good teacher at integrating it in your classroom. It's who you know and the ability in this district to go to any teacher at any level and say, "Help me with this." I have never had anybody say, "I'm too busy. I can't." It's the whole atmosphere of our district, which is, we're here for each other. Any time I have a problem, I know I can go to someone and if I go to enough people, someone's gonna have an answer for me and help me out. We have all levels and everyone is willing to try and help you figure it out.

The Tech. Core members seemed to be the most at ease talking about their opportunities for collaboration. Further data and investigation into this questions warrant follow-up.

### **SUMMARY**

The results appear to support this district's technology professional development for the teachers. Participants reported that the professional development program was an effective and potentially consequential professional development strategy. Yet, the analysis cannot remain here. It is through an investigation of the nuances expressed by subgroups of teachers and school leaders that we may begin to more clearly understand participants' perceptions, assessments, and applications of the learning from this professional development model.



Three themes emerged from this analysis of the survey data: (1) Teachers who were more involved generally provided more positive feedback than did teachers who hadn't had as much time in the professional development program; (2) Teachers differed in their response to their own technology confidence; (3) School leaders differed in their response to barriers to teachers' implementation of technology. Each of these themes requires further consideration.

### **Theme One**

Teachers who were more involved generally provided more positive feedback than did teachers who hadn't had as much time in the professional development program. The first theme that emerged from the survey data analysis suggests that the professional development grouping influenced participants' perceptions about the professional development program. Teachers from the Tech. Core and those in the earlier professional development groups offered more positive responses to survey items than did teachers from more recent professional development groupings in later phases of the District reform. Principals and district leaders confirmed this trend through interview data and informal conversations. For example, one principal remarked: "I really look forward to working with the teachers in the Tech. Core. They listen. They ask smart questions. They offer suggestions and solutions. It is clear they are here to collaborate and problem-solve with anyone willing."

One district leader validated this perception when remarking about the training. She said,

The people that come in really doing some kind of innovative things, the ones that I use for training, are leading the group. They're doing short, quick presentations, just a little show and tell, and then they ask the participants what they're working on. A couple people will share what they want to get out of this. Then the one facilitating will pull something up and show how to do it. So it's kind of whatever that group wants to do, whatever they want to work on. The facilitators are good listeners and know how to solve the problems teachers are facing.

It is to be expected that teachers exposed to the technology professional development over a longer period of time might outperform those that are relatively new to this reform effort. But, if the technology professional development program that started out so structured, collaborative, and informative, is now off-course and only offers a piecemeal approach with no incentives nor accountability, then the impact on instruction, and future participants, will be minimal.

## Theme Two

Teachers differed in their response to their own technology confidence in relation to the technology uses of their students. A second theme suggested by the data analysis is the difference in participating teachers' own technology confidence scores and the technology uses they report for their students. Teachers consistently provided more positive responses to the technology confidence questions than they did to the student uses of technology. One possible explanation for the discrepancy between teacher technology confidence and the opportunities for using technology by students is the lapse due to the change process. It was stated repeatedly in the Tech. Core focus group that teachers who didn't use the technology instructional strategies from the professional development program were often seen back at the same training sessions the following year. One participant shared her frustration over this phenomenon:

I can't tell you how many summers that I went and I was a trainer for the websites, the teacher websites, and Dorothy [name changed to protect anonymity] would say, "Okay. Everybody who's brand new, you're just starting out, you're gonna go to room 25" and I'd walk in and there were the same people that were there last year and I would say, "No. This is just for the brand new teachers." And, someone would respond, "Yeah. Well, but I didn't use mine and I've forgotten everything, so I have to start again." It's very frustrating after about 5 years of seeing those same faces over and over again.

Another teacher continued the point further with this comment:

There are a number of people who the only time they ever work on their websites is on those Wednesdays and so they're always back to square one and you're trying to fix the same problem over and over again.

This suggests an underlying flaw in how the professional development program is executed, namely, developing the relationships between teachers, new and veteran, trained long-term and those that are just beginning. In previous change theory, Fullan (2001) reports,

The key to successful change is the improvement in relationships between all involved and not simply the imposition of top down reform. The new emphasis in educational change is based on creating the conditions to develop the 'capacity' of both organizations and individuals to learn.

In this particular instance, to help teachers take on the belief that these new strategies and this new knowledge will help their students learn better and be more successful academically, the District could work to develop the relationship between those teachers that are more confident and those that need the additional support.

The teachers who have been trained repeatedly might self-report that they are confident about what they are able to do themselves, but they haven't internalized the learning to the point of being able to teach it to someone else. This follows Cambourne's (1988) Conditions For Learning research. The teachers need the freedom to approximate their learning and many opportunities to use what they are thinking about a new concept or software. If the professional development sessions are just an arena for sharing new activities they wouldn't allow enough time for teachers to reflect on and then try out their new learning, and then that learning won't stick. For instance, hands-on sessions that follow-up to a showcase session, where teachers are armed with their own curriculum plans and student data, and they work on developing their own projects to support their curriculum, while being supported by the trainers. Teachers who do attempt a new project later by themselves may get frustrated and give up, assuming they will have another opportunity at a later date to try again. This leads to another possible reason this disconnect is occurring with teachers.

A final possible explanation for this phenomenon is the perception by teachers that they do not have enough time to plan for instruction, reflect on their learning, and try new innovative approaches to the curriculum. What is important for learning, according to Cambourne, is that the environment keeps offering opportunities for the learner to use burgeoning technological skills and abilities with a built-in feedback loop. The blockade to these opportunities is the chance to take them without risking defeat or embarrassment. Teachers are traditionally thought to be all knowing. The attempts at technology integration that offer no risk of failure will be pursued, otherwise, teachers will continue to play it safe and wait for another opportunity.

### **Theme Three**

School leaders differed in their response to barriers to teachers' implementation of technology. A final theme suggested by the data analysis is the difference in perceptions as expressed by participating teachers and school leaders. School principals and district leaders across all demographic variables consistently provided more positive responses to questions regarding supports and barriers to technology integration than did the teachers. Two possible explanations bear further discussion: (a) The training available to and required of school

leaders may impact their perceptions of this model of technology professional development; and (b) school leaders may be more guarded in their responses than teachers.

This model of technology professional development relies on observation of technology practice. Observation is a strategy that requires skill and benefits from experience. Teachers have limited experiences and training in observing instruction. School administrators have more extensive training and authentic opportunities to practice observing, analyzing, and synthesizing instruction. These observational experiences combined with content training may provide school leaders with the knowledge, strategies, skills, and dispositions necessary to maximize the potential for learning through this model of technology professional development. The need to be the leading voice at a school site may further serve to provide school administrators with a sense of systemic and systematic coherence. A deeper understanding of current instructional practices could further support this leadership voice, yet many principals have been out of the classroom for many years (Thomas & Knezek, 2002). Therefore, the data suggest that the technology professional development program should incorporate more opportunities for administrators and teachers to share their expertise in observing classroom instruction through collaborative projects.

## CHAPTER 5

### FINDINGS, LIMITATIONS, IMPLICATIONS AND RECOMMENDATIONS

I am your reluctant integrator because I had no idea how to use the computer. I had never even, I mean when I put the mouse in my hand, I was like, "Whoa. What's going on here?" It was just all new to me. So I started in Group One and we all went through as a team. The sixth grade team all went through together and it was really nice because we were able to help each other out and just work together and share things and so that's how I got started...

They were always very understanding, very supportive and very excited about what we were doing and, you know, gave us a lot of freedom. Like I said earlier on, we went in as a team, a 6th grade team. We share in this district, more than any other district probably in the United States, sharing materials. If I make something, I e-mail it to every elementary school teacher in the school district. If I find a website, I e-mail it out to everyone, so we are not doing this constantly, reinventing the wheel. We are not spending, or we should not be spending, hours and hours looking for sites because, you know, if I don't know something, if I can't find something, I know she can or I know she can and we will e-mail each other and ask each other, you know, "Is there a good site for Math tests. Is there a cool site for this science lesson?" And we keep each other in the know and we do a ton of sharing. (Third grade teacher)

This teacher's quotes are an amalgam of the approach to learning that the teachers illustrated in their interviews and through the survey results. This portrayal reveals the ways that teachers seek the information that they need to learn and provide the necessary support that contributes to the professional development and expertise of their colleagues in the learning communities that informally develop within the schools.

The teachers within this district came to the technology professional development program following their own individual paths, yet coming together with one common goal: to help their students to be more successful and engaged academically. Each individual joined the process at different starting points, with different knowledge and skill levels. In response to this wide range of knowledge and skills, the Project Director formulated training experiences that would address the individual needs of each participant, were focused on the

needs of students, changed over time as needs and resources changed, and would grow the district's leadership pool all at the same time.

Professional development has long been peripheral to the work of teachers, schools, and school systems (Darling-Hammond, 1997; David & Shields, 1999; Lieberman, 1995; Lyons & Pinnell, 2001; Mizell, 2001; Sparks, 2002; Speck & Knipe, 2001). Most typically, professional development has been directed at large groups of teachers gathered together for a day to hear about new software, technologies, or instructional strategies. This didactic, episodic practice is a carry-over, "from the days when teachers were considered 'trained' when they entered the profession and from that time forward needed only cursory looks at specific materials, in order to know how to use them" (Rodgers & Pinnell, 2002, p.1).

Renewed attention has been placed on professional development for teachers as the nation searches for ways to realize the promise and potential of a standards-based system of education; a system in which all students are expected to meet or exceed high levels of academic achievement. It is clear that the success of the standards-based reform initiative is dependent on the preparedness, quality, and determination of teachers (Alvarado, 1998; Darling-Hammond, 1997; Fullan & Hargreaves, 1991; Lyons & Pinnell, 2001). In fact, the quality of this nation's teachers may well be the most critical issue facing public education. If students are to meet world-class standards there must be a parallel emphasis on supporting world-class teachers. And world-class teachers will require access to world-class professional development practices (Alvarado, 1998; Boser, 2001; Hirsh, 2001; Sparks, 2002).

In this chapter, the researcher will first summarize the study and then discuss the findings from the research questions examined in the study. In Chapter 4, the analysis of the survey data and the interviews revealed several themes, which are discussed further in this chapter. Next, the researcher discusses implications derived from the findings and finally, offers recommendations for practice and future research.

## **SUMMARY OF THE STUDY**

### **Purpose and Rationale**

In order to provide adequate overall professional development in integrating technology for classroom teachers, it is necessary to know what factors should be present and

how they relate to and support successful professional development for classroom teachers in general. One way to address this issue is to focus on a successful exemplar.

Citrus Heights is an award-winning<sup>5</sup> exemplar of technology integration. Over the past 9 years, this small urban district has focused its resources on the re-design of its kindergarten through eighth grade classroom curriculum to support educational reform through the use of technology, including hardware, software, and teacher professional development with the goal of increasing student academic success.

In this case study, the researcher investigated the reform that has taken place at Citrus Heights, focusing on the factors in professional development that supported third through sixth grade classroom teachers' meaningful integration of technology and literacy. To better understand the influence of technology integration on classroom practices, the researcher investigated ways these teachers learned to integrate technology through individual efforts, work with colleagues, and formal staff development. The context in which these teachers operated was also significant, so the researcher looked at both the supports and barriers facing these teachers as they attempted to integrate technology into their classrooms. Finally, the researcher considered the influence teachers' technology self-efficacy had on their technology decisions and explored some of the effective ways that they used technology in their instruction.

---

<sup>5</sup> Top Ten Technology District, 2002  
Computerworld Honors Award, 2002  
SD Regional Chamber of Commerce Award, 2002  
California School Board Association Golden Bell Award, 2001  
Celebration for Civic Excellence Award, 2000  
Smithsonian Award, 2000  
National Technology in Education Award, 2000  
American School Board Journal Magna Award, 2000  
Ohana Foundation Leadership in Educational Technology Award, 2000  
Business Week's Smart Links Award, 1999  
American Association of Superintendents' Promising Practices Award, 1999

## **Methodology**

This case study was designed to learn more about the impact of an innovative approach to technology professional development, in a small, suburban school district, on third through sixth grade literacy instruction. This study was also developed in order to document an exemplary professional development model's evolution for possible use in large, urban school districts that are working towards increased technology integration in the service of improving student literacy achievement.

Two research questions formed the foundation of this case study, and a number of sub-questions have been added for clarification in order to consider the relationships between teachers' perceptions of the professional development program and their confidence integrating technology.

### **QUESTION ONE**

What are the components of the technology professional development used in this district?

#### **Sub-Questions**

- What was the content of the technology professional development program?
- What structures, or formats, were used within the technology professional development program and within each session?
- How was the technology professional development program facilitated?
- What changes in resources occurred for and within the technology professional development program?

### **QUESTION TWO**

How do teachers perceive their ability to use technology and apply it in their teaching in order to promote student literacy learning?

#### **Sub-Questions**

- What differences were noted in the teacher's ability to use technology, both professionally and with students in the classroom?
- What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?
- What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program?



- What differences were noted in the characteristics of collegiality and/or collaboration between teachers?

## **DATA COLLECTION**

The first step in data collection was the informal interviews conducted with three district administrators and the classroom visits by the researcher in order to build the background information that frames the data collection and analysis phases. These interviews included the superintendent - for overall vision and history of the district, the Information Services Director – for the history of technology hardware and software in the district and the vision of technology integration, and the Project Director – for the history of the professional development program in the district.

After interviews with district administrators, a survey given over the Internet provided foundational, quantitative data that were analyzed, synthesized, and prioritized to discern participants' perceptions and overall assessment of their ability to integrate new technology knowledge. All third through sixth grade teachers in the district were invited via email to participate in the online survey. This yielded a sampling of 28 teachers, defined the overall landscape of teachers' perceptions about the technology professional development program, and provided a conceptual backdrop through which to determine patterns and potential themes. The initial analysis of the survey data provided broad and tentative answers to the research questions and was essential for informing the content of both the site administrator and the focus group interviews.

The researcher interviewed all eight of the school site administrators. These interviews provided a context for the site implementation of the technology professional development program. Principals spoke in generalities about the impact the technology professional development program was having on student learning. The principals spoke more specifically about teacher use of technology within instruction. The principal interviews involved a smaller number of respondents who produced a larger range of responses. These site administrator interviews prompted new questions that were subsequently explored in the focus group interviews.

The focus group interviews were conducted at the school site. Four teachers volunteered to participate via the online survey. The nature of this conversational inquiry allowed participants to explain their answers, build on the thinking of others, and provide

unanticipated responses. The focus groups involved the smallest number of respondents yet produced the most detailed level of response.

The research design integrated three inquiry processes: a quantitative survey, qualitative interviews with district and site administrators, and qualitative focus group interviews. This methodological triangulation strengthened the reliability and the internal validity of the study by offering strategic points of comparison across and within inquiry strategies and populations (Best, 1981). The strongest data were those that reverberated throughout the research layers. For this study, triangulated or verified data points permitted reasoned conclusions about teachers' perceptions and possible implications of the technology professional development program.

### **Summary of Key Findings**

All data points verified that participants perceived the district's technology professional development program as an effective training mechanism. Teachers and principals noted the power and potential of the components of the technology professional development. Participants liked the content of the trainings and thought the trainings were appropriate and relevant. Does this mean that the technology professional development was a success? Fullerton and Quinn (2002) contend, "One of the primary goals of professional development is change – change in teacher knowledge, change in instruction, change in student learning, and eventual change in school and district progress" (as cited in Rodgers and Pinnell, 2002, p. 134).

The data set reveals that the program indeed had some impact on the instructional practice of participants. Perhaps these self-reported changes are sufficient for the short timeline imposed by this study. Perhaps these early indicators of change coupled with the limited data serve to suggest the potential of the technology professional development and are the precursors to deeper, more meaningful change. The research literature is clear that substantive instructional change is dependent upon time for teachers to observe, consider, discuss, practice, and refine new practices (Darling-Hammond & McLaughlin, 1995; Garet, et al, 2001; Lieberman, 1995; and Robb, 2000). Observations in the classroom could have provided a more reliable picture of the extent of the change in instruction that has occurred. One final note must be made on this exploratory case study. The findings here point to areas

of further study due to a small sample size. The following is a brief summary of the results by research question.

### **QUESTION ONE**

The purpose of this research question - what are the components of the technology professional development used in this district - was to focus on the program of technology professional development utilized within this exemplary district and how the program evolved over the course of the reform within this district. The interviews with key district administrators yielded five themes embedded in the technology professional development program as it unfolded. These themes included: (1) adaptive, (2) progressive, (3) responsive, (4) collaborative, and (5) multi-layered. The program itself grew over many years and through five phases. It was not pre-planned, but somewhat reactionary and unfolded based upon the vision of the Director of Information Services, in partnership with the superintendent, and adapted as new technology became available. The Director of Information Services was progressive in his vision for this small district to become a connected learning community within the district and between home and school, while not letting the districts' low-income levels dictate educational opportunity or quality. The changes in the technology professional development program were delineated by phases due to the responsive nature of this district to teacher and student needs. As new needs surfaced, the Director of Information Services, along with the Program Director, would determine if new technologies were needed, and if so, how to accomplish that task, and what changes in training needed to occur in response to the technology and/or the needs being expressed by teachers. Through the course of this district's reform efforts, teachers thrived on the collaborative nature of the technology professional development program from the summer camps to the monthly follow-up sessions at the school sites. The many opportunities for learning highlight the multi-layered approach this district took to its technology professional development program. Teachers were initially trained during summer camps and then monthly follow-up sessions were facilitated at each school site. These monthly meetings were facilitated by school principals and led by members of a group called the Tech. Core. The Tech. Core is comprised of teachers who were in the initial training group and then chosen by the Program Director to be leaders in technology at each school site. Finally,

office hours are held by each Tech. Core member on a weekly, drop-in basis for teachers to get support with integrating technology into instruction.

## **QUESTION TWO**

Research question two focused on teachers' experiences in the Citrus Heights technology professional development program and teachers' perceptions of their ability to use technology successfully – How do teachers perceive their ability to use technology and apply it in their teaching? Three data collection techniques were used to address this question – an online survey administered to third through sixth grade teachers in the District, focus group interviews with a volunteer subset of survey respondents, and site administrator interviews. Although limited due to the small sample size,  $n = 28$ , the following are key findings in the data set from the online survey, the site administrator interviews, and the focus group interviews.

### **Sub-Question One**

*What differences were noted in the teachers' ability to use technology, both professionally and with students in the classroom?*

Teacher technology confidence is noteworthy within this district. Participant ratings on the individual items of technology confidence on the survey were totaled; total scores could range from 20 – 100. Scores for the 27 respondents ranged from 52 to 100 ( $M = 76.04$ ,  $SD = 19.538$ ). Appendix H lists total technology confidence scores for each participant. Teachers reported that they dedicated more class time to the overall use of computers and related technologies. Many teachers began this reform by scheduling students to use the computer in a rotating fashion, which often led to student game playing due to the lack of connection between the classroom objectives and the use of the computer. Teachers have worked to capitalize on students' sense of competition and enjoyment of games by incorporating more skill-based games, student-centered and relevant projects, and engaging the students in higher-level thinking skills noted by the teachers as being important for student achievement. The application of problem-solving and collaboration to complete projects appears to be linked to teachers' knowledge of state standards and their own shift in beliefs about how technology can impact student achievement.

Teachers noted that their own curiosity led them to pursue additional information and influenced their use of technology for themselves and with their students. For instance, many technology uses were incorporated due to a teacher wanting to problem-solve a situation for an individual student who was having difficulties, or just for increasing their own knowledge because they didn't get enough additional support since they were the leaders in this technology professional development and district reform. Teachers also reported using technology to help them track student assessments and progress towards the mastery of state standards.

There were four notable characteristics of teachers who were more confident. They used: (1) research in their planning, (2) technology to assess students, (3) technology to analyze their assessment data, and (4) they promoted the safe and healthy use of technology. The findings from this research suggest teachers, especially veteran teachers, see the value in the activities of planning and assessment of student learning, as well as, the value in using technology to help with productivity and efficiency.

Also noteworthy are the bottom technology confidence indicators. Teachers are reluctant in front of their peers. They are willing and truly desire more opportunities to share resources, even lesson plans, but they are least likely to choose a leadership role within their school site or at the District level. Teachers also reported low confidence with applying the technology standards within the curriculum and confidence scores indicated that not all teachers believed technology was helpful in improving reading and writing achievement.

Yet, administrators indicated technology use had increased tremendously, and this was supported during the focus group interviews as well. Responses on the survey indicated the most common student uses of technology were low-level, but noted higher level thinking, problem solving and collaboration as the most important uses of technology to support student achievement. Through the focus group interviews, this notion was supported. The teachers were able to offer many examples of student technology use that supported literacy achievement.

The number one influence outside of the technology professional development program was coaching and mentoring by peers. Instances of co-planning, sharing of resources, and visiting other teachers' classrooms abound in the focus group interview data. The second and third influences that appeared were the sharing of resources and tech.

support. The teachers reported feeling supported by the site administrators, but did not see enough support in funding for planning time. This was in direct contradiction of the administrators sharing anecdotes regarding paid time out of the classroom for planning with colleagues. But, in all data sets, it was noted that funding and time were a problem.

Finally, teachers felt they were using data to inform their instruction, yet administrators felt more training needed to occur in order to support teachers with these strategies. The administrators noted assessment as a next step for the technology professional development program. The teachers felt the next step should focus on developing better ways to share resources and collaborate across the district.

### **Sub-Question Two**

*What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?*

Teachers and administrators alike were quite positive when it came time to discuss the things that supported the implementation of technology. Teachers reported that they had access to the necessary instructional materials and tech support. They noted support from principals and feedback as well. And, they suggested the professional development opportunities at the school sites were a support also. The focus group interviews highlighted peer support as a major factor influencing teachers' use of technology, and data from the site administrator interviews suggest the same to be true.

### **Sub-Question Three**

*What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development?*

Time was consistently noted as the biggest barrier to teachers implementing technology into their curriculum. New teachers are working diligently to harness their knowledge of many areas – student needs, content areas, instructional strategies, time management, planning, etc. And, veteran teachers, many of whom take on additional leadership roles within the school site, note time as lacking as well. The other barrier mentioned in the survey responses was the impact testing and assessments have on instructional time. Veteran teachers found this more of a challenge and yet this was not a subject that came up during the focus group interviews. These two obstacles – time and

testing - are commonly found throughout the state and within the industry of education. It is not surprising that these teachers have the same issues.

#### **Sub-Question Four**

*What differences were noted in the characteristics of collegiality and/or collaboration between teachers?*

It is not surprising that teachers felt they had the most input into the implementation of technology within their own classrooms. And, opportunities to collaborate with peers, that hadn't existed previously, were highlighted in the focus group interviews. This finding suggests the structures within school sites, for example, Wednesday afternoon technology integration meetings and Tech. Core weekly office hours, are working to support teachers through collaboration. Teachers asked for more time for these opportunities and a more efficient way to collaborate across the district.

### **DISCUSSION OF LIMITATIONS**

#### **Methodological Limitations**

These conclusions are necessarily limited by the very structures that inform them. The survey data involved a small sampling of teachers who participated in the technology professional development program, yet it remains nothing more than a sampling of a much larger population, many of whom may not have responded because they were not as engaged or as positive about teaching with technology as those teachers who did. The survey instrument, while designed with care and precision, conveys a point of view. The questions that were asked and the questions that were not asked affect the range and quality of responses. The focus group interviews were designed to represent participants' authentic point of view, yet the voices of the volunteers cannot extend to those teachers who chose not to make their voices heard.

#### **SAMPLING**

Although **all** site administrators agreed to be interviewed and do not fall in this category (i.e., the group was not sampled), the focus group interviews depended on non-probability sampling. The groups were formed based on volunteers, as was the online survey group. This procedure raises concerns about which sub-groups of teachers and Tech. Core

teachers elected to participate and which sub-groups chose not to. This became apparent in the survey responses within Section One, Participant Profile. Eleven respondents chose to skip the question affiliating them with a specific professional development group. Through discussions with the Program Director, the conclusion was drawn that teachers might have feared they could be identified if they chose to answer this question along with the other statements within the profile section. The focus group included four participants, all were classroom teachers and two were Tech. Core teachers. The focus group was small and may not be representative of all teachers within the district. Therefore, additional focus groups should be convened to address this weakness in future research efforts.

### **INSTRUMENTATION**

The survey gathered data from participants in an online environment. As mentioned earlier, the Program Director had concerns about those reluctant to use technology participating in this type of environment. Due to the fairly low response rate, it should be concluded that additional surveys should be printed and distributed at school sites to give reluctant technology users a risk-free opportunity to participate. This researcher visited every school site with printed surveys, but it is suggested that the printed copies be personally handed out during a staff meeting rather than during a lunch period or left for teachers to complete independently. The issue of time is so great for teachers that the survey should be given in a non-threatening way with plenty of support for participation online for all parties.

The reluctance to answer demographic information regarding the group each participant was in should also be addressed. Although it was mentioned in the contact email and on the first page of the survey, anonymity is a concern of teachers. The question of group participation could be rewritten so teachers click a box noting the specific number of hours a teachers has completed rather than which group they participated in.

### **AUTHENTICITY**

The data were verified through multiple steps. First, the data were triangulated through the collection and analysis of various sources of data: teacher surveys, site administrator interviews, and district administrator interviews. These multiple sources of data provided corroborating evidence and shed light on the themes that evolved out of the data analysis. Many of the strategies above contributed to the authenticity of this study. Informed



consent, member checking, and peer debriefing contributed to meeting the criterion of fairness in this study. Reflecting back to participants what the researcher heard during interviews to be certain the meaning was understood and the perspectives of the participants were focused upon, provided an opportunity for them to reflect on what they had said. This, in turn, contributed to building a relationship of trust, thus encouraging the development of authenticity for the study. By sharing summaries of the research as themes emerged with the Program Director, which included the perspectives of all the informants, the possibility for authenticity was provided. Every possible effort to protect the identity of the informants was made. The location of the schools in which participants taught was masked to the extent possible. Every effort to share the results with as broad an audience as possible will be made in the form of this case study report, ensuring that at a minimum every participant receives a copy.

### **Contextual Limitations**

Conclusions are limited to the specific contexts, experiences, perspectives and perceptions of the actual participants. This examination of the quality of and potential for a new model of professional development for teachers is admittedly context specific. Citrus Heights School District [a pseudonym], as mentioned in earlier chapters, has embarked on an ambitious, large-scale reform initiative in which the premiere strategy for student success is technology professional development for its classroom teachers. A system-wide and systematic commitment to professional development is somewhat unique. Thus, this case study research was designed specifically to strategically analyze an innovative model of professional development within the current context of Citrus Heights School District and to ascertain its effect on teachers' use of technology in their classrooms, specifically focused on literacy teaching.

Lastly, the technology professional development does not exist outside the complexities, contradiction, and idiosyncrasies that define the teaching profession. As this study moves from an analysis of what is, to a discussion of what could be, it will be necessary to examine the ways in which the technology professional development fits within the more complex frame of educational change.

## Summary

If this particular study were to be conducted again, specific data should be gathered regarding the exact amount of time teachers spend on various technology-related tasks, and then a detailed analysis done to draw correlations between the level of technology integration they are able to achieve in their classrooms and the amount of time spent on various tasks beyond time spent in structured professional development sessions. This data gathering could be conducted through logs teachers keep of their own time spent as well as actual student use of technology. More detailed data along with extended focus group interviews would allow for correlations to be drawn and more specific suggestions given on how teachers should best spend their time to optimize the technology integration in support of student achievement.

The summary examination of the results from the survey in the previous chapter is a means, not an end, to this inquiry into this technology professional development. The numerical data must now be filtered through context and infused with reasoned interpretations to move the analysis toward meaning and significance. Why did the findings turn out this way? What are the possible explanations for these results? What questions do these findings resolve and what questions do these findings suggest?

## DISCUSSION OF FINDINGS

In the early days of Citrus Heights' reform efforts, the introduction of numerous computers into the classrooms radically transformed the physical classroom environment and impacted the way teachers communicated, yet for the most part, student-learning tasks remained unchanged. Gradually, however, new patterns of teaching emerged at all school sites.

### Emergent Themes

The researcher identified and labeled the over-arching themes, summarized in Table 29, that represent the five main ideas drawn from the data set on this technology professional development program. The district's approach was (1) adaptive, (2) progressive, (3) responsive, (4) collaborative, and (5) used a multi-layered approach.

The district's adaptive approach is revealed in the way that the professional development team and the Program Director continuously incorporated new technologies, assimilated the physical environment to meet student and teacher needs, and addressed yearly

administrative mandates. Each phase of the reform, although not planned in a linear fashion, unfolded in a spiral (Fountas & Pinnell, 2001) encompassing more and more topics; technologies, and needs each year.

The district's progressive, cutting-edge approach is depicted via the unique strategies used to motivate teachers. For example, the district brought in well-known guest speakers, maintained an innovative camp-like atmosphere during the summer, added a cohort-like quality to the training by adding twenty percent of the district staff each year, and used teacher ideas to help develop new technologies. Also characterizing the progressiveness of this District was the visionary leadership of the Director of Information Services and the very notion of using technology as the catalyst for school reform.

The responsiveness of the District is shown in how the administrative staff strives to be culturally receptive, illustrated, in part, by the decision to use teachers as trainers, conducting supplemental training on site, listening to teachers voicing concerns about student needs, and linking training to district initiatives. The Board's goals evolved to incorporate their vision for student use of the computers they funded, therefore, the technology professional development program included a broader vision for student use. This was identified as a pivotal point in the reform, because the focus was drawn away from strictly teacher use of technology for instructional purposes, toward student use of technology. This is illustrated by the incorporation of the NETS for students (International Society for Technology in Education, 2003) shared during the training sessions and supporting discussions during certain monthly follow-up onsite professional development sessions.

Collaboration was a key ingredient shown through the multiple opportunities afforded teachers, demonstrated partly through the use of teachers as trainers, both at the district level and at the individual school sites, and through the development and use of the intranet within the district. The use of teachers as trainers generated shared leadership and ownership in the vision originally set forth by the Director of Information Services and the District Board of Education.

The multi-layered approach was characterized by the robust nature of the technology professional development program sessions. The core events, hosted as summer mini-camps, were supplemented by site assistance and further professional development, follow-up

meetings held monthly, and resources available online around the clock. One 12-year veteran summarized her feelings about the technology professional development:

For those of us who have been here a long time, I can say this is, without a doubt, the best staff development plan or program that I have ever been through. It beats any methods classes that I had as a student teacher or any master's classes that I have taken. The way that they have gone about planning and implementing the staff development here is just, it's just absolute perfection in my book.

**Table 29. Over-Arching Themes**

<b>Theme</b>	<b>Factors</b>
Adaptive	<ul style="list-style-type: none"> <li>• Physical environment</li> <li>• Technology</li> <li>• District and Board Expectations</li> </ul>
Progressive	<ul style="list-style-type: none"> <li>• Development of new technologies</li> <li>• Guest speakers</li> <li>• Summer Mini Camps</li> <li>• Cohort quality to training</li> </ul>
Responsive	<ul style="list-style-type: none"> <li>• Teacher needs – training &amp; support</li> <li>• Supplemental training at school sites</li> <li>• Student needs</li> <li>• District initiatives</li> </ul>
Collaborative	<ul style="list-style-type: none"> <li>• Teachers as trainers</li> <li>• Multiple opportunities</li> </ul>
Multi-layered Program	<ul style="list-style-type: none"> <li>• Summer Mini Camps</li> <li>• Site-based professional development</li> <li>• Tech. Core</li> <li>• Follow-up group meetings</li> <li>• Online resources</li> </ul>

### **Big Ideas Drawn From the Findings**

Given the current interest in teacher professional development as well as technology acquisition and use, it is not surprising that there are several implications that arise from this study. The following is a careful consideration of a set of key findings that were threaded through the survey, site administrator interviews, and the focus group interviews.

#### **SEEING IS BELIEVING**

Most participants applauded the technology professional development program for its responsiveness and the multiple opportunities it affords teachers to learn new technologies. For far too long, traditional models of professional development have been disconnected from the real work and real concerns of teachers (Lieberman, 1995; Lyons & Pinnell, 2001;

Robb, 2001; Speck & Knipe, 2001). The technology professional development program eliminates this sense of disconnection by situating teacher learning within the physical context of a fully functioning classroom and by a current, district teacher. Teachers acknowledged, "There's something very powerful about seeing a colleague doing it, not just hearing someone talk about it."

Yet, there was a group of teachers noting that the demonstrations did not match their own workplace reality. The teachers demonstrating in the technology professional development program were too skilled and the students in the examples were too high or not as diverse as the ones they have in their classrooms. Although this was a small group of teachers, this finding suggests the need to address the range of classrooms that teachers are able to visit and the Program Director's decision-making process.

Citrus Heights chose the Tech. Core teachers of the highest caliber, in particular, teachers with the capacity to model effective literacy instruction and those already showcasing strong technology integration. The selected teachers are experienced, self-motivated, life-long learners with the highest level of professional integrity. Selecting accomplished teachers was an intentional response to the discourse suggesting that professional development forums need to provide models of best practice to prepare teachers to think and work in new ways (Alvarado, 1998; Darling-Hammond, 1997; Lyons & Pinnell, 2001; Schmoker, 1996). However, because some participants were unable to see themselves in the practice of a highly accomplished teacher, the District might question if the teacher should reflect the overall district. This researcher would further question if this reflection should be that of what has been, what is, or what could be? Citrus Heights decided to employ Tech. Core teachers who represented models of what could be.

The classrooms were intentionally furnished to support the District vision of fingertip access for students. The designers of the technology professional development program considered it important to provide models of technology rich classrooms for teachers and principals. The classrooms used for the technology professional development program provided an opportunity to model the organization, accessibility, and effective use of classroom technology.

It seems that "seeing is believing" is only true to a point. Seeing a real teacher in a real classroom is clearly preferable to de-contextualized trainings housed in school

auditoriums or off-site at a conference center. However, seeing a successful teacher in a supportive environment was problematic for many participants. Therefore, additional supports in the way of explanation and visits with students present might divert attention from this professional skepticism.

### **I CAN DO THIS!**

The technology confidence indicators from the online survey suggest certain strengths of the technology professional development. Teachers who responded to the survey were most confident in the safe and healthy use of technology resources and the data suggest teachers are happy teaching with technology. Technology confidence scores indicated teachers also felt confident managing the technology resources within the classroom and evaluating resources for accuracy and suitability for their students. These confidence indicators are consistent with the District goals and objectives as well. One of the District's five goals is focused on implementing technology and topics covered in the technology professional development reflect this consistency. Teacher professional development topics in most years sustained and extended teachers' use of technology in support of instruction. It wasn't until 2002, after several years of insuring that teachers felt comfortable using technology themselves that the technology professional development program began to focus on student use of technology in support of learning.

Technology confidence indicators from the survey also suggest next steps for future technology professional development. The lowest-ranking five indicators included three items about working with peers. These items suggested a lack of confidence in front of others – talking about their teaching with peers, training others how to teach with technology better, and leading in teaching with technology. The lack of confidence was most evident in teachers who had been teaching ten or fewer years. The literature suggests this may be due to new teachers still developing their self-efficacy as a teaching professional (Gold, 1996; Tschannen-Moran & Woolfolk Hoy, 2001; Woolfolk Hoy & Burke-Spero, 2000).

### **HERE'S WHAT I HAVE TO SAY**

The survey and focus group interviews illustrated that teachers feel they have the most input into the implementation of technology within their own classrooms. This phenomenon might be attributed to people feeling comfortable enough to take a risk and

offer reflections or suggestions to improve things for the greater good or that of their students. Therefore, opportunities for teachers to work with their peers should be added to address this issue through the use of additional collaborative structures and opportunities for teachers to engage in peer discussions and instructional problem-solving. The research literature suggests supporting teachers' discussions of technology successes with students before evolving toward discussions of better meeting student needs (Johnson & Johnson, 1999; Joyce & Showers, 1988; Lieberman, 1995; Richardson, 2002; Sandholtz, Ringstaff, & Dwyer, 1997).

### **SHEER FRUSTRATION**

Two obstacles found in the online survey, and both the administrator and focus group interviews - time and testing/assessment taking away from instructional time - are commonly found in research on educational innovation (citations from chapter 2). It is not surprising that teachers in Citrus Heights have the same issues. These issues should be addressed in future technology professional development planning.

The Tech. Core noted frustration with teachers who repeated the same training offerings year after year. Although Tech. Core teachers felt the other teachers were not making an effort, this phenomenon raises the question of who's failing whom? You certainly cannot blame someone for not understanding new concepts the first time they are exposed to new ideas. Is it an issue of complacency on the part of the teachers? Or are they overworked? Or has this technology professional development program, by hand picking those that would lead the training sessions and follow-up meetings throughout the years, created a two-tiered system of an elite that are closed off to the needs of others? Have the Tech. Core teachers become so sophisticated that they have forgotten what it feels like to be new with technology. Certainly, there is cause for concern. Yet, a closer look reveals the fact that teachers who became involved with the technology professional development program in the fourth or fifth phase, in many instances, were the teachers who needed additional support to integrate technology. Some of these teachers were mandated to attend, while others were new to the professional and were still trying to figure out the art of teaching. These two groups needed structures and supports to help them with the ominous task of integrating technology. But, right when they were joining, the funding began to dwindle and eventually fall far short of

the District needs. The levels of frustration with all three of these groups – the Tech. Core, the reluctant integrators, and the new teachers – are understandable. The District must address these issues of funding and additional support as it moves full steam ahead.

Additionally, the researcher has concluded that as the professional development program proceeded over time, it became piecemeal and responsive to technology changes rather than to teachers. Teachers not included in the original professional development or those who came later to the district tended not to engage as fully with the program, thereby creating a larger gap between those teachers that were self-starters and those that were merely complying with District mandates. This was noted in the focus group interviews through statements of frustration of more engaged teachers with those teachers who needed the same or similar training year after year. Future technology professional development might address these issues by offering multiple forms of support with incentives and tying those incentives to desired outcomes.

### **ALL ABOUT ME – OR IS IT THE KIDS?**

In both the online survey and teacher and administrator interviews, respondents expressed a need for the technology professional development program to assist teachers to help students gain new skills or enhance existing skills through critical thinking, collaboration, presentation, and self-learning using technology. This researcher suggests that the district should address this issue by shifting the focus from basic uses of technology to ways it may be used with students by focusing on student assessment. Previous studies of professional development suggest that it is efficacious to use student assessment to drive instruction as teachers plan and reflect (Allington, 2002; Bennett, 1994; Bryan, Merchant, & Cramer, 1999; Dwyer, 1995; Fullerton & Quinn, 2002; Robb, 2000; Sparks, & Loucks-Horsley, 1989). By utilizing student assessment data directly during the professional development time, the District would be decreasing the complaints regarding the lack of time available for planning as well as addressing the principals' stated need for more data analysis to inform instructional planning.

### **RECOMMENDATIONS**

The findings here should interest teachers and school site administrators, staff developers and educational technology coordinators, district personnel responsible for



professional development, university education programs, and any other entity that has made heavy investments in technology. Educational stakeholders will want to explore the many project gallery sources available on the Internet for examples of teacher projects and project reviews across grade levels as well as sample workshops, extensive technology integration Web resources, and free technology resources (see Appendix I for suggested web addresses). While this is only one project and one study, the long-term nature of Citrus Heights' reform and the practical significance of the findings related to teacher technology integration should help in the promotion of various technologies and technology integration in their respective schools and school districts.

### **Teachers and Administrators**

This study should be of interest to K-12 teachers and school site administrators. School administrators will want to know about the success factors of the Tech. Core teachers and the site implementation. How might similar programs be designed at the school site level?

Through the survey results and the focus group interviews, it was made clear that teachers would appreciate more opportunities to collaborate with their peers. Becker and Riel (2000) found that teachers who had more opportunity to interact with their peers on a regular basis, were more likely to integrate technology into their teaching. One example, would be to engage in lesson study opportunities where teams of teachers would gather to plan, try out, and reflect on a series of lessons. More information about lesson studies can be found at: [www.lessonresearch.net](http://www.lessonresearch.net). This kind of professional study would support the integration of technology in all areas of the curriculum, especially literacy integration, while directly supporting student needs. Administrators must be creative and actively seek innovative ways to provide teachers with planning and development time focused on technology integration.

### **Staff Developers and Educational Technology Coordinators**

Those involved in planning and facilitating professional development programs should also be interested in these results. Professional development directors and coordinators, as well as Directors or Superintendents of Curriculum and Instruction, will want to explore technology as the catalyst for school reform. Of special interest would be the

structure and cohesion of professional development used by Citrus Heights, including the multiple forms of support offered, involving teachers in the decision-making and the training, supplementing technical support with peer support, and cultivating strong administrative support for reform and training efforts. Further considering the multi-layered support systems and opportunities would benefit all school districts planning for integration of technology. In order to capitalize on the expertise of all teachers in a district, it is recommended that new teachers be invited into the Tech. Core to share their expertise with using new technologies, or given chances to rotate into the job of expert throughout the year. These opportunities would further benefit from the incorporation of a peer coach model of professional development where teachers work side-by-side to create shared teaching experiences with opportunities to reflect on the best practices utilized and student successes.

The teacher technology confidence scores should also be of interest. In particular, it was found that teachers with less experience are less confident. Therefore, additional supports for new teachers need to be included in the professional development program. Additionally, small school districts with fewer resources in staffing and funding may want to utilize some of the support factors used in Citrus Heights' professional development program such as cross-district groupings of teachers to support collegial interaction as a means of providing an outlet for teachers to discuss their technology integration ideas and activities.

Teachers specifically and repeatedly asked for a more formal system for sharing resources. It is recommended that a repository be developed, for example a dynamic database, that is searchable by many dimensions (grade level, learning need, etc.). One example of this is called SCORE and is available from the San Diego County Office of Education. This resource lists a plethora of ideas for teaching and can be searched for particular curricular or student needs.

Last, but certainly not least, anyone planning professional development must include time for planning and collaboration. Research confirms that it is imperative that teachers, like children, are given many opportunities to construct their own meaning and get feedback (Brandt, 2000; Cambourne, 1988; Lieberman, 1995; Lyons & Pinnell, 2001; Robb, 2001). Given the many time pressures of K-12 environments, why would teachers want to participate in a technology professional development program? What induced teachers to volunteer at the different phases in the Citrus Heights program? Does the technology

professional development program at Citrus Heights provide enough choice, feedback, and goal setting for these teachers? What types of motivational techniques are the most effective, and do the types of motivators change or shift during their involvement in the program? Might there be a developmental shift in the types of motivators depending on teacher confidence and competence with technology integration and length of service or development of professional teaching self-efficacy? Answers to these questions will be important to those wanting to extend the technology professional development program.

### **School District Personnel**

The results should also pique the interest of district administrators and policy-makers who have spearheaded campaigns for or against technology expenditures. They may see how technology professional development programs can impact student achievement. Both administrators and politicians want more evaluation of the return on investment from technology professional development programs such as Citrus Heights'. They should find present evaluation helpful as they designate significant portions of school technology funding to professional development. With the flux in both state and federal funding over the past decades, superintendents and boards of education need to design systems of funding that will not be impacted by this flux in funding.

### **University Teacher Education Programs**

Lastly, universities preparing new teachers and providing graduate education should be interested in these results. Particularly of interest would be the information about new teachers' levels of confidence. Self-efficacy of new teachers was tied to the resources available, supportive mentoring programs, and the demographics of a school site (Johnson, Kardos, Kauffman, Liu, & Donaldson, 2004; Tschanmen-Moran & Woolfolk Hoy, 2001). In order to address these issues, teacher preparation programs could partner with school districts to support the new teachers as they venture into the profession. As well as, work within the school districts to support teachers as researcher through the graduate programs in education. Of particular interest would be the results noting the lack of confidence working with peers. University programs could address this in two ways: (1) working to develop the skills needed to work collaboratively and present in front of peers, and (2) partnering with schools to develop professional development schools and learning communities.

## FURTHER RESEARCH

Researchers might compare various technology professional development programs to determine the factors that are more valuable or essential for teacher technology integration. Many new studies have been published recently on technology professional development, to which this study adds. Further investigation is needed into the following questions. What components contribute to the most positive effects? Are the positive effects due to working collaboratively? Is the length of a program a key factor? Is the success attributable to the technology support structures? Is it the professional development focus on students and learner-centered projects that often involve real-world tasks? Are there incentives that might better motivate participants? Could direct classroom assistance and mentoring offer better support for teachers? How might that occur?

Further research might also determine if the technology professional development program proposed here can be applied to other forms of teacher education. While this program was fully integrated within a district, could similar results come from shorter-term professional development institutes? Given that this technology professional development program involves face-to-face training, could enough features be effectively replicated in a fully online program?

In addition, the researcher did not inquire whether certain technology integration projects were more enticing for students. For example, does a WebQuest embed more or less challenge, relevancy, novelty, or meaningfulness than a global collaboration project? To what degree should the tasks be real world or authentic? Would a simulation suffice? The student perspective on technology integration would add much to the knowledge base.

Also of interest is the degree to which Citrus Heights, and its sub-groups of teacher grade level groupings, developed into learning communities. What key components combined to help form these learning communities? Within other contexts online forums, peer feedback, debates, and guest chats have helped teachers share ideas and project advice, leading to the conclusion that technology can support the development of learning communities (Keller, Ehman, & Bonk, 2003). Would additional online or real time supports increase the effectiveness of technology professional development programs? Therefore, another research point is that of the impact of learning communities on teacher professional development related to technology integration.

And, finally, a look at the interaction between new teachers and veteran teachers could shed light on what tools and knowledge each member brings to a partnership. At the onset of this research, the researcher assumed new teachers would bring cutting edge technology skills and veteran teachers would bring tried and true pedagogy. This research did not follow the path of investigating this relationship. But, as districts pursue collaborative efforts, research into the relationship between new teachers and veteran teachers may prove invaluable.

### SUMMARY

While extensive generalizations from this study are not possible, it seems clear that local education agencies wishing to integrate technology should ground their programs in sound principles of professional development, including long-term engagement, collegial and collaborative interactions, and adequate support for both the technology itself and curriculum integration. While the Citrus Heights technology professional development program was not the sole determiner for growth in each teacher, the researcher considers that the components and structure of this technology professional development program played an important role in teacher change and the growth displayed through the survey responses. In summary, Citrus Heights should look to future technology professional development by offering multiple forms of support with incentives and tying those incentives to desired outcomes, involving faculty in decision-making to secure buy-in, continuing to use faculty models, supplementing technical support with peer support, and cultivating strong administrative support. In particular, would be the support model of pairing new and experienced teachers in order to maximize the strengths of both – in teaching and in technology. These methods will help deal with the persistent concerns and barriers to technology integration suggested by the data collected in this study.

Programs seeking to replicate the successful technology innovation of Citrus Heights, therefore, cannot put their faith in one particular variable but must find ways to utilize many support structures and program components. They must also recognize that Citrus Heights capitalized on teachers who were enthusiastic about technology. Teachers in this sample noted their own curiosity and pursuit of knowledge as a key factor in their growth technology confidence and in technology integration. Without this intrinsic drive to seek new

knowledge, the results of this professional development program would likely have been different. Professional development programs like that developed in Citrus Heights speak to many audiences: those teaching with technology, those assessing it, and those providing the funding for it. Hopefully, the positive findings here will be extended to teacher professional development efforts in other settings and organizations.

## REFERENCES

- Allington, R. L. (2002). What I've learned about effective reading instruction. *Phi Delta Kappan*, 83(10), 740-747.
- Alpert, D., & Mazzoni, K. (1998). *Senate bill 2042*. Chap. 548. Retrieved November 12, 2005 from <http://www.ctc.ca.gov/commission/agendas/2004-06/june-2004-7A.pdf>
- Alvarado, A. (1998). Professional development is the job. *American Educator*, 18-23.
- Anders, P., Hoffman, J., & Duffy, G. (Eds.). (2000). *Teaching teachers to teach reading: Paradigm shifts, persistent problems, and challenges* (Vol. 3). Mahwah, NJ: Erlbaum.
- Au, K. (Ed.). (2000). *A multicultural perspective on policies for improving literacy achievement: Equity and excellence* (Vol. 3). Mahwah, NJ: Erlbaum.
- Bay, J. M., Reys, B. J., & Reys, R. E. (1999). The top 10 elements that must be in place to implement standards-based mathematics curricula. *Phi Delta Kappan*, 80(7), 503-506.
- Bennett, C. K. (1994, Winter). Promoting teacher reflection through action research: What do teachers think? *Journal of Staff Development*, 15(1), 34-38.
- Berrens, P., Bohara, A., Jenkins-Smith, H., Silva, C., & Weimer, D. (2001). *The advent of Internet surveys for political research: A comparison of telephone and Internet samples*. Retrieved November 12, 2006 from [www.lafollette.wisc.edu/facStaff/](http://www.lafollette.wisc.edu/facStaff/)
- Best, J. W. (1981). *Research in education*. Englewood Cliffs, NJ: Prentice-Hall.
- Bishop, A. (2000). Technology trends and their potential for bilingual education. In P. A. DiCerbo (Ed.), *Issue and Brief*, 7. Washington, DC: National Clearinghouse for Bilingual Education.
- Bogdan, R. C., & Biklen, S. K. (1992). *Qualitative research for education: An introduction to theory and methods*. Boston: Allyn & Bacon.
- Boote, D. N., & Belle, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. *Educational Researcher*, 34(6).
- Boser, U. (2001). Pressure without support. *Education Week*, 20. Retrieved January 8, 2006 from <http://www.edweek.org>
- Bracey, G. (2000). *High stakes testing*. (CERAI-00-32). Milwaukee, WI: University of Wisconsin-Milwaukee, Education Policy Research Unit.
- Brandt, R. S. (2000). *Education in a new era*. Alexandria, VA: ASCD.
- Bruce, C. (2004, June). Information literacy as a catalyst for educational change (Keynote Address to the 3rd Lifelong Learning Conference, Yeppoon, Australia). UNESCO background paper reprinted with permission in *Lifelong learning: Who's responsibility and what is your contribution?: Papers from the 3rd Lifelong Learning Conference*.

- Bryan, J. K., Merchant, C., & Cramer, K. (1999). America calls: technology-based interdisciplinary planning and instruction. *Classroom Leadership*, 2(5). Alexandria, VA: Association for Supervision and Curriculum Development. Retrieved October, 18, 2005 from [http://www.ascd.org/ed\\_topics/cl199902\\_bryan.html](http://www.ascd.org/ed_topics/cl199902_bryan.html)
- California Commission on Teacher Credentialing. (1992). *Success for beginning teachers: The California New Teacher Project*. Sacramento, CA: California Department of Education.
- California Commission on Teacher Credentialing. (1998). *California standards for the teaching profession*. Sacramento, CA: California State Department of Education & California Commission on Teacher Credentialing.
- California Department of Education (1998). *English-language arts content standards for California public schools, kindergarten through grade twelve*. Sacramento, CA: California Department of Education.
- Cambourne, B. (1988). *The whole story: Natural learning and the acquisition of literacy in the classroom*. Katonah, NY: Richard C. Owen.
- Carey, A. R., & Worthington, K. (1997, November 6). Elementary computing. *USA Today*, p. 4D.
- Carroll, T. G. (2003). *No dream denied - a pledge to America's children*. Washington, D. C.: National Commission on Teaching and America's Future.
- Center for the Future of Teaching and Learning (2003). *Teaching and California's future*. Retrieved October 23, 2003 from [http://www.cftl.org/publications\\_latest.php](http://www.cftl.org/publications_latest.php).
- Center for Teaching and California's Future. (2002). *California's teaching force: Key issues and trends 2002*. Retrieved September 20, 2003 from [http://www.cftl.org/publications\\_latest.php](http://www.cftl.org/publications_latest.php).
- Coleman, D. (2002, March). Inside Collaboration Newsletter - Levels of Collaboration. *Collaboration Strategies, LLC*. Retrieved November 12, 2005 from [http://www.collaborate.com/publication/newsletter/publications\\_newsletter\\_march02.html](http://www.collaborate.com/publication/newsletter/publications_newsletter_march02.html)
- Collaboration. (2005). In *Wikipedia: The Free Encyclopedia*. Retrieved November 12, 2005 from <http://en.wikipedia.org/wiki/Collaboration>
- Collegiality. (2005). In *Wikipedia: The Free Encyclopedia*. Retrieved November 12, 2005 from <http://en.wikipedia.org/wiki/Collegiality>
- Coomber, R. (1997). Using the internet for survey research. *Sociological Research Online*, 2(2). Retrieved September 12, 2005 from <http://www.socresonline.org.uk/socresonline/2/2/2.html>
- Coppola, E. M. (2004). *Powering up: Learning to teach well with technology*. New York: Teachers College Press.
- Creswell, J. W. (1997). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage Publications.



- Creswell, J. W. (2002). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Darling-Hammond, L. (1997). *Doing what matters most: Investing in quality teaching*. New York: National Commission on Teaching and America's Future.
- Darling-Hammond, L. (1999). Target time toward teachers. *Journal of Staff Development*, 20(2), 31-36.
- Darling-Hammond, L. (2000). *Solving the dilemmas of teacher supply, demand and standards: How can we ensure a competent, caring, and qualified teacher for every child*. New York: National Commission on Teaching & America's Future.
- Darling-Hammond, L., & Baratz-Snowden, J. (2005). *A good teacher in every classroom: Preparing the highly qualified teachers our children deserve*. San Francisco, CA: John Wiley & Sons.
- Darling-Hammond, L., Holtzman, D. J., Gatlin, S. J., & Vasquez Heilig, J. (2005). Does teacher preparation matter? Evidence about teacher certification, Teach for America, and Teacher Effectiveness. *Educational Policy Analysis Archives*, 13(42).
- Darling-Hammond, L., & McLaughlin, M. W. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan*, 76(8), 597-604.
- David, J. L., & Shields, P. M. (1999). Standards are not magic. *Education Week*, 18(31), pp. 40, 42.
- Department of Education. *No Child Left Behind Act*. Retrieved August 23, 2004 from [www.ed.gov/nclb/landing.jhtml](http://www.ed.gov/nclb/landing.jhtml)
- Denzin, N. K., & Lincoln, Y. (2003). *Strategies of qualitative inquiry* (2nd Ed.). Thousand Oaks, CA: Sage Publications.
- Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (2nd Ed). New York: John Wiley & Sons.
- DiSessa, A. (2000). *Changing minds: Computers, learning and literacy*. Cambridge, MA: MIT Press.
- Dresang, E. T., & McClelland, K. (1999). Radical change: Digital age literature and learning. *Theory Into Practice*, 38(3), 160-167.
- Duffy, G. G. (1997). Powerful models or powerful teachers? An argument for teacher-as-entrepreneur. In S. Stahl, & D. Hayes (Eds.), *Instructional models in reading* (pp. 351-365). Mahwah, NJ: Erlbaum.
- Duffy-Hester, A. M. (1999). Teaching struggling readers in elementary school classrooms: A review of classroom reading programs and principles for instruction. *Reading Teacher*, 52(5), 16.
- Dwyer, D. C. (1995). *Changing the conversation about teaching, learning, and technology: A report on 10 years of ACOT research*. Cupertino, CA: Apple Computer.
- Erickson, F. (1986) Qualitative methods in research on teaching. In M.C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 119-161). New York: Macmillan Library Reference.

- Evans, P. M., & Mohr, N. (1999). Professional development for principals. *Phi Delta Kappan*, 80(7), 530-532.
- Farnan, N. & Grisham, D. (in press). Teacher education programs do not turn out "finished products." Rather, such programs graduate "highly qualified novices." In S.D. Lenski, D.L. Grisham, and L.S. Wold (Eds.), *Literacy teacher preparation: Ten truths teacher educators need to know*. Newark, DE: International Reading Association.
- Fountas, I., & Pinnell, G. S. (2005). Professional development to help teachers implement systematic phonics, spelling and vocabulary lessons K-3. Retrieved on October 18, 2005 from <http://pd.heinemann.com/institutes/products/051021PHONIL.aspx>
- Frankfort-Nachmias, C. & Nachmias, D. (1996) *Research methods in the social sciences*. (5th Ed.). London: Arnold.
- Fraser, B. J. (1998). Science learning environments: Assessment, effects and determinants. In B.J. Fraser & K.G. Tobin (Eds.), *The international handbook of science education* (pp. 527-564). Dordrecht, The Netherlands: Kluwer.
- Fullan, M. (2001). *The new meaning of educational change* (3rd ed.). New York: Teachers College Press.
- Fullan, M., & Hargreaves, A. (1991). *What's worth fighting for in your school?* New York: Teachers College Press.
- Fullerton, S. K. & Quinn, M. P. (2002). Teacher research as professional development: A study of teaching and learning. In E.M. Rogers & G.S. Pinnell (Eds.), *Learning from teachers in literacy education: New perspectives on professional development* (pp. 119-134). Portsmouth, NH: Heinemann.
- Gall, M. & Vojtek, R. O. (1994). *Planning for effective staff development: Six research-based models*. Eugene, OR: ERIC Staff Development Clearinghouse on Educational Management.
- Garet, M., Porter, A., Desimone, L., Birman, B., & Yoon, S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-945. Retrieved January 6, 2004 from <http://aztla.asu.edu/ProfDev1.pdf>
- Garmston, R. J. (1999, Fall). Better by the bunch. *Journal of Staff Development*, 20(4), 2.
- Glanz, J. (1999, Summer). Action research. *Journal of Staff Development*, 20(3) 22-23.
- Gold, Y. (1996). Beginning teacher support: Attrition, mentoring and induction. In J. Sikula (Ed.), *Handbook of research on teacher education* (2nd Ed., pp. 584-594). New York: Macmillan.
- Gonzales, C., Pickett, L., Hupert, N., & Martin, W. (2002). The regional educational technology assistance program: Its effects on teaching practices. *Journal of Research in Technology Education*, 35(1), 1-18.
- Gove, P. B. (Ed.) (2002). *Webster's Third New International Dictionary, Unabridged*. New York: Merriam-Webster. Retrieved August 13, 2005 from <http://unabridged.merriam-webster.com>

- Grisham, D. (2000). Class size reduction: Learning from the California experience. *Reading Online*, 4(5). Retrieved October 24, 2004 from [http://www.readingonline.org/editorial/edit\\_index.asp?HREF=/editorial/november2000/index.html](http://www.readingonline.org/editorial/edit_index.asp?HREF=/editorial/november2000/index.html)
- Guskey, T. R. (1999). Apply time with wisdom. *Journal of Staff Development*, 20(2), 10-15.
- Hawley, W. D., & Valli, L. (1999). The essentials of effective professional development: A new consensus. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 127-150). San Francisco: Jossey-Bass Publishers.
- Hesse-Biber, S., Kinder, T. S., & Dupuis, P. (1997). *HyperResearch v. 2.6* [Computer software]. Randolph, MA: ResearchWare, Inc.
- Hirsh, S. (2001). We're growing and changing. *Journal of Staff Development*. Retrieved on January 8, 2006 from <http://www.nsd.org/library/jsd/hirsh223.html>.
- Holland, P. W. (2002). Measuring progress in student achievement: Changes in scores and score-gaps over time. In *Using the National Assessment of Educational Progress to Confirm State Test Results* (Appendix B, pp. 1-27). Washington, DC: National Assessment Governing Board.
- Honey, M. (2002). New approaches to assessing students' technology-based work. In N. Dickard (Ed.), *Great expectations: Leveraging America's investment in educational technology*. Washington, DC: Benton Foundation, Communications Policy Program and Education Development Center, Inc., Center for Children and Technology.
- Hord, S. M. (1997). Professional learning communities: what are they and why are they important? *Issue About Change*, 6(1). Retrieved March 14, 2006 from <http://www.seidl.org/change/issues/issues61.html>
- Howze, P. (2003). Collegiality, collegial management, and academic libraries. *Journal of Academic Libraries*, 29(1), 40-43.
- Hubbard, R. S., & Power, B. M. (2003). *The art of classroom inquiry: A handbook for teacher-researchers*. Portsmouth, NH: Heinemann.
- Hughes, M. T., Cash, M. M., Ahwee, S., & Klinger, J. (2002). A national overview of professional development programs in reading. In E.M. Rogers & G.S. Pinnell (Eds.), *Learning from teachers in literacy education: New perspectives on professional development* (pp. 9-28). Portsmouth, NH: Heinemann.
- International Society for Technology in Education (2000). *National educational technology standards for teachers*. Eugene, OR: Author.
- International Society for Technology in Education (2003). *National educational technology standards for students*. Eugene, OR: Author.
- Johnson, M. A., & Johnson, G. A. (1999). The insiders: Development in school with colleagues can succeed. *Journal of Staff Development*, 20(4), 27-29.
- Johnson, S. M., Kardos, S. M., Kauffman, D., Liu, E., & Donaldson, M. L. (2004, April). *The support gap: New teachers' early experiences in high-income and low-income*

- schools*. Paper presented at the American Educational Research Association, San Diego, CA.
- Joyce, B., Murphy, C., & Showers, B. (1996). The River City Program: Staff development becomes school improvement. In B. Joyce & E. Calhoun (Eds.), *Learning experiences in school renewal: An exploration of five successful programs*. College Park, MD: ERIC Clearinghouse.
- Joyce, B. R., & Showers, B. (1988). *Student achievement through staff development*. New York: Longman.
- Joyce, B. R., & Showers, B. (1996). The evolution of peer coaching. *Educational Leadership*, 53(6) 12-16.
- Kaye, B. K., & Johnson, T. J. (1999). Research Methodology: Taming the Cyber Frontier. *Social Science Computer Review*, 17, 323-337.
- Keller, J. B., Ehman, L. H., Bonk, C. J. (2003). *Professional development that increases technology integration by K-12 teachers: Influence of the TICKIT program*. Paper presented at the annual meeting of American Educational Research Association, Chicago, IL.
- Knowles, M. S. (1950). *Informal adult education*. New York: Association Press.
- Knowles, M. S. (1984). *Andragogy in action: Applying modern principles of adult education*. San Francisco: Jossey Bass.
- Knowles, M. S. (1990, 1973). *The adult learner: A neglected species*. Houston, TX: Gulf Publishing.
- Korthagen, F. A., & Kessels, J. P. (1999). Linking theory and practice: Changing the pedagogy of teacher education. *Educational Researcher*, 28(4), 4-17.
- Labbo, L. D. (2003, February). Computers, kids, teachers and literacy instruction: Practical ideas from classrooms (and would you believe that they are all supported by research?). Keynote Speech presented at the annual conference of Wisconsin State Reading Association, Milwaukee, WI.
- Laczko-Kerr, I., & Berliner, D. (2003). In harm's way: How undercertified teachers hurt their students. *Educational Leadership*, 60(5), 34-39.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Lemke, C. (2003, November). *Making the case to teachers*. Paper presented at the Education Summit: Inventing Illinois' Future, Chicago, IL.
- Leu, D. J., Jr., & Kinzer, C. K. (2000). The convergence of literacy instruction with networked technologies for information and communication. *Reading Research Quarterly*, 35, 108-127.
- Lieberman, A. (1995). Practices that support teacher development: Transforming conceptions of professional learning. In M.W. McLaughlin & I. Oberman (Eds.), *Teacher learning: New policies, new practices* (pp. 185-201). New York: Teachers College Press.

- Loeb, S., Darling-Hammond, L., & Luczak, J. (2005). How teaching conditions predict teacher turnover in California schools. *Peabody Journal of Education*, 80(3), 44-70.
- Lorenzen, M. (2005). *Collegiality and the academic library*. Retrieved on November 12, 2005 from <http://www.michaellorenzen.com/collegiality.html>
- Loucks-Horsley, S., Hewson, P. Love, N., & Stiles, K. (1998). *Designing professional development for teachers of science and mathematics*. Thousand Oaks, CA: Corwin Press.
- Lyons, C.A., & Pinnell, G. S. (2001). *Systems for change in literacy education: A guide to professional development*. Portsmouth, NH: Heinemann.
- Mann, D., & Shafer, E.A. (1997). Technology and achievement. *The American School Board Journal*, 184(7), 22-23.
- Marzano, R. J. (1992). *A different kind of classroom: Teaching with dimensions of learning*. Alexandria, VA: Association for Supervision and Curriculum Development.
- McEneaney, J. (2000, January). Learning on the web: A content literacy perspective. *Reading Online*, 3. Retrieved December 20, 2004 from [http://www.readingonline.org/articles/art\\_index.asp?HREF=/articles/mceneaney/index.html](http://www.readingonline.org/articles/art_index.asp?HREF=/articles/mceneaney/index.html)
- McLaughlin, M. W., & Talbert, J. E. (1993). *Contexts that matter for teaching and learning*. Stanford, CA: Center for Research on the Context of Secondary School Teaching, Stanford University.
- Miller, G. A., & Gildea, P. M. (1987). How children learn words. *Scientific American*, 257, 94-99.
- Mizell, H. (2001). How to get there from here. *Journal of Staff Development*. Retrieved January 8, 2006 from: <http://www.nsd.org/library/jsd/mizell223.html>
- Moore, P. A., & Page, N. (2002). Teaching for information literacy: Online professional development challenges. In D. Singh, A. Foneska & B. de Rosario (Eds). *School libraries for a knowledge society: Proceedings of the 31st Annual Conference of the International Association of School Librarianship* (pp. 153-168). Seattle, WA: International Association of School Librarianship.
- Moursand, D. (1999). *Will new teachers be prepared to teach in a digital age? A national survey on information technology in teacher education*. Santa Monica, CA: Milken Exchange on Educational Technology. Retrieved April 12, 2005 <http://www.mff.org/publications/publications.taf>
- Moursund, D., & Smith, I. (2000). *Research on internet use in education*. Eugene, OR: International Society for Technology in Education. Retrieved January 4, 2004 from <http://www.iste.org/research/reports/tlcu/internet.cfm>
- Mouza, C. (2002). Learning to teach with new technology: Implications for professional development. *Journal of Research on Technology in Education*, 35(2), 272-289.

- Murphy, C. U. (1999, Spring). Use time for faculty study. *Journal of Staff Development*, 20(2). Retrieved on December 24, 2004 from <http://www.nsd.org/library/publications/jsd/murphy202.cfm>.
- National Staff Development Council. (2001). *NSDC for educators*. Oxford, OH: Author. Retrieved December 18, 2004 from [www.nsd.org/educatorindex.htm](http://www.nsd.org/educatorindex.htm)
- National Staff Development Council (2003). Moving NSDC's staff development standards into practice: *Innovation configurations*. Oxford, OH: Author. Retrieved December 23, 2004 from [www.nsd.org/educatorindex.htm](http://www.nsd.org/educatorindex.htm)
- Neville, P. (2003). Cruising the cerebral superhighway. *Journal of Staff Development*, 24(1), 20-23.
- Newmann, F. M., & Wehlage, G. G. (1995). *Successful school restructuring*. Madison, WI: University of Wisconsin, Center on Organization and Restructuring of Schools.
- Olsen, B., & Anderson, L. (2006). Courses of action: A report on urban teacher career development. *Urban Education*, 42(1).
- Olson, L. (2000). Quality counts: Report examines teacher quality. *Education Week*, 19(17), 3.
- Padrón, Y. N., & Waxman, H. C. (1996). Improving the teaching and learning of English language learners through instructional technology. *International Journal of Instructional Media*, 23(4), 341-354.
- Paolo, A. M., Bonaminio, G. A., Gibson, C., Partridge, T., & Kallail, K. (2000). Response rate comparisons of e-mail and mail distributed student evaluations. *Teaching and Learning in Medicine*, 12, 81-84.
- Parsad, B., & Jones, J. (2005). *Internet access in U.S. public schools and classrooms: 1994-2003*. (NCES 2005015). Washington, D.C.: National Center for Education Statistics.
- Patton, M. Q. (2001). *Qualitative research & evaluation methods*. Thousand Oaks, CA: Sage Publications.
- Pianfetti, E. S. (2001). Teachers and technology: Digital literacy through professional development. *Language Arts*, 78, 255-262.
- Prensky, M. (2004, Fall). The wisdom (and worth) of "generation techs." *Strategy+Business*. Retrieved March 23, 2006 from <http://www.strategy-business.com/press/article/04314?pg=0>
- Punch, K. F. (1998). *Introduction to social research: Quantitative and qualitative approaches*. London: Sage Publications.
- Putnam, R., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher*, 29(1), 4-15.
- Reinking, D. (1999). *Electronic literacy*. Athens, GA: National Reading Research Center, University of Georgia.
- Reinking, D., McKenna, M. C., Labbo, L. D., & Kieffer, R. F. (Eds.). (1998). *Handbook of literacy and technology: Transformations in a post-typographic world*. Mahwah, NJ: Erlbaum.

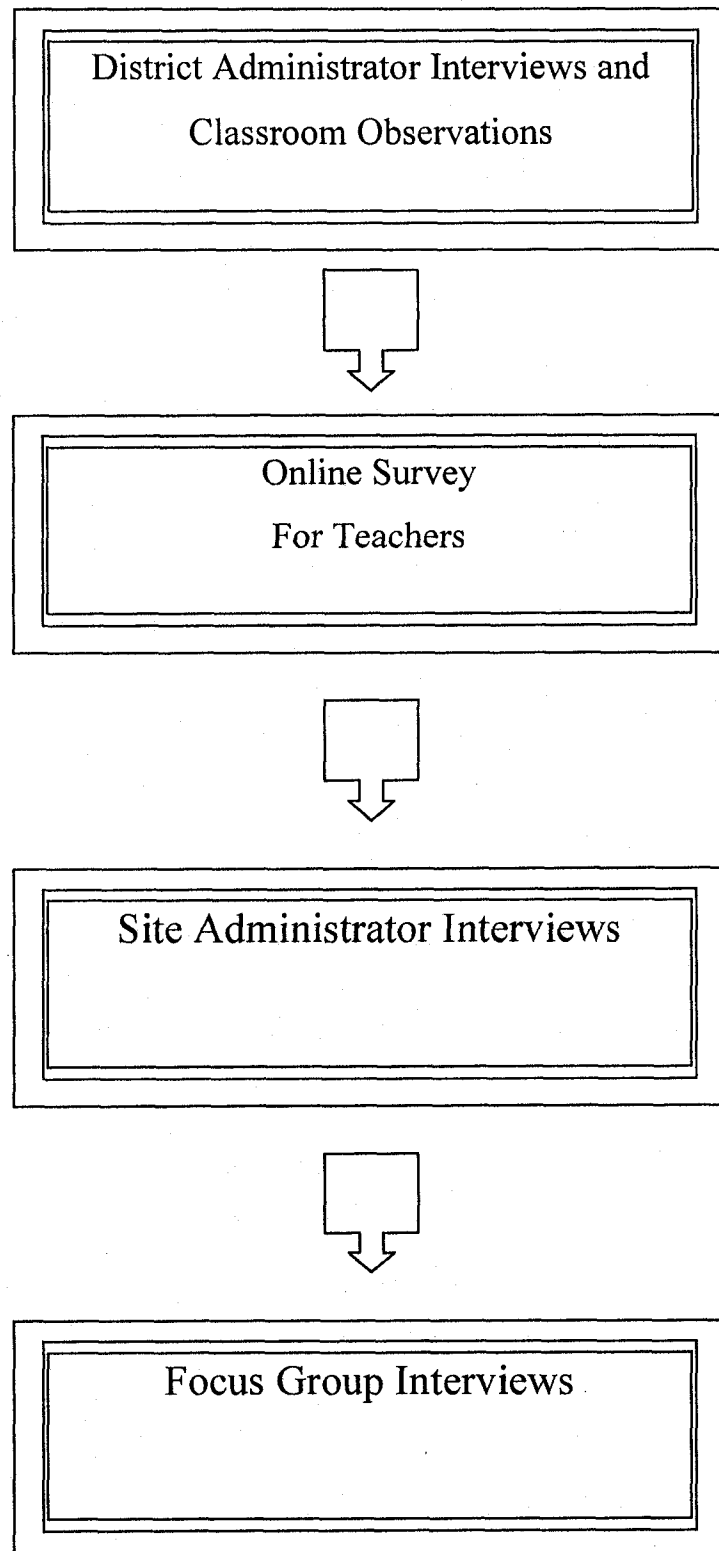
- Richardson, J. (1998, December). Investing in teacher learning key to growth in District 2. *Results*. Oxford, OH: NSDC.
- Richardson, J. (2000, February/March). Teacher research leads to learning, action. *Tools for schools*. Oxford, OH: National Staff Development Council.
- Richardson, J. (2002, February/March). Reach for the stars: Individual learning plans allow teachers to take charge of their own learning. *Tools for schools*. Oxford, OH: National Staff Development Council.
- Riel, M., & Fulton, K. (2001). The role of technology in supporting learning communities. *Phi Delta Kappan*, 82(7), 518-523.
- Robb, L. (2000). *Redefining staff development: A collaborative model for teachers and administrators*. Portsmouth, NH: Heinemann.
- Rodriquez, G., & Knuth, R. (2000). *Critical issue: Providing professional development for effective technology use*. Retrieved July 12, 2003 at <http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm>.
- Rogers, E. M., & Pinnell, G. S. (Eds.). (2002). *Learning from teaching in literacy education: New perspectives on professional development*. Portsmouth, NH: Heinemann.
- Sagor, R. (1992). *How to conduct collaborative action research*. Alexandria, VA: Association Supervision and Curriculum Development.
- Sandholtz, J., Ringstaff, C., & Dwyer, D. (1997). *Teaching with technology: Creating student-centered classrooms*. Williston, VT: Teachers College Press.
- San Diego City Schools (2003). *San Diego City Schools at a glance*. Retrieved July 13, 2003 from <http://www.sdcs.k12.ca.us/comm/factsheet/sdcs>
- Schonlau, M., Fricker, R. D., Jr., & Elliott, M. N. (2001). *Conducting research surveys via e-mail and the web*. Santa Monica, CA: RAND Corporation.
- Seely Brown, J. (2004, September). Visual literacy. *Edutopia*, 1.
- Shanker, A. (1996). Quality assurance: What must be done to strengthen the teaching profession. *Phi Delta Kappan*, 78(3), 220-224.
- Sparks, D. (1999). How can schools make time for teacher learning? *Results*. Retrieved July 14, 2003 from <http://nsds.org/library/results/res3-99learning.html>
- Sparks, D. (2002). *Designing powerful professional development for teachers and principals*. Retrieved January 8, 2006 from <http://www.nsdsc.org/sparksbook.html>
- Sparks, D., & Loucks-Horsley, S. (1989). Five models of staff development for teachers. *Journal of Staff Development*, 10(4), 40-57.
- Speck, M. (1996, Spring). Best practices in professional development for sustained educational change. *ERS Spectrum*, 33-41.
- Speck, M., & Knipe, C. (2001). *Why can't we get it right? Professional development in our schools*. Thousand Oaks, CA: Corwin Press.

- Springer, L., Stanne, M. E., & Donovan, S. S. (1999). Effects of small-group learning on undergraduate in science, mathematics, engineering, and technology: A meta-analysis. *Review of Educational Research*, 69(1), 21-51.
- Sprinthall, N. A., Remain, A. J., & Thies-Sprinthall, L. (1996). Teacher professional development. In J. Sikula (Ed.), *Handbook of research on teacher education* (2nd ed., pp. 666-703). New York: Macmillan.
- Tablet PC. (2006). In *Wikipedia: The Free Encyclopedia*. Retrieved March 26, 2006 from [http://en.wikipedia.org/wiki/Tablet\\_PC](http://en.wikipedia.org/wiki/Tablet_PC)
- Tapscott, D. (1998). *Growing up digital: The rise of the net generation*. New York: McGraw-Hill.
- Teale, W. H. (2002, August). *A synthesis of principles and practices of effective early literacy instruction: The results of research reviews, a national survey, and interviews with teachers who use technology for literacy instruction in outstanding ways*. Paper presented at the World Congress of the International Reading Association. Edinburgh, Scotland.
- Their, M. (2005). *Literacy in the science classroom: Improving science and language skills*. Retrieved October 18, 2005 from <http://pd.heinemann.com/hu/products/SPSC1.aspx>
- Thomas, L. G. & Knezek, D. G. (2002). *Standards for technology-supported learning environments*. Alexandria, VA: National Association of State Boards of Education.
- Thompson, S. R., & Wood, F. H. (1993). Assumptions about staff development based on research and best practice. *Journal of Staff Development*, 14(4), 52-57.
- Tracey, D. H., Heath, M., & Truss, J. (2002). "Side-by-side": A technology education model for pre-service and in-service teachers. *Reading Online*, 6(2), 7.
- Tschanmen-Moran, M. & Woolfolk Hoy, A. (2001). Teacher efficacy: Capturing an elusive concept. *Teaching and Teacher Education*, 4(2), 171-187.
- University of California at Irvine, Department of Education. (1992). *A vision for coaching*. Retrieved September 17, 2003 from [www.gse.uci.edu/pds/Mentor.html](http://www.gse.uci.edu/pds/Mentor.html)
- U.S. Department of Commerce. (2004). *A nation online: Entering the broadband age*. Retrieved January 19, 2005 from <http://www.ntia.doc.gov/reports/anol/>
- U.S. Department of Education, National Center for Education Statistics. (2003). *Digest of education statistics 2002* (NCES 2003-060). Washington, DC: Author.
- U.S. Department of Education, Office of Educational Research and Improvement. (2000, April). *Teacher use of computers and the internet in public schools*. Washington, DC: Author. NCES 2000-090. Retrieved January 12, 2005 from: [http://www.futureofchildren.org/pubs-info2825/pubs-info.htm?doc\\_id=69787](http://www.futureofchildren.org/pubs-info2825/pubs-info.htm?doc_id=69787)
- U.S. Department of Education, Office of Educational Technology. (2005). *Toward a new golden age in American education: How the internet, the law and today's students are revolutionizing expectations*. Washington, D.C.: Author.



- U.S. Department of Education, Office of the Under Secretary, Planning and Evaluation Service. (2000). *Does professional development change teaching practice? Results from a three-year study*. Washington, DC: Author.
- Valdez, G., McNabb, M., Foertsch, M., Anderson, M., Hawkes, M., & Raack, L. (2000). *Computer-based technology and learning: Evolving uses and expectations*. Retrieved May 28, 2004 from <http://www.ncrel.org/tplan/cbtl/toc.htm>
- Valmont, W. (2000). The effects of teacher purpose on achievement gains. *Reading and Writing Quarterly*, 16, 289-294.
- Waddoups, G. L., Wentworth, N., & Earle, R. (2004). Teaming with technology: A Ccse study of a faculty design team developing electronic portfolios. *Journal of Computing in Teacher Education*, 20(3), 113-120.
- Walker, D. (1999, October). Technology and literacy: Raising the bar. *Educational Leadership*, 57(2), 18-21.
- Weimer, M. (2002). *Learner-centered teaching: Five key changes to practice*. San Francisco: Jossey-Bass.
- Wilhelm, J. D., Baker, T. N., & Dube, J. (2001). *Strategic reading: Guiding students to lifelong literacy 6-12*. Portsmouth, NH: Heinemann.
- Wood, F. H., & Killian, J. E. (1998). Job-Embedded Learning Makes the Difference in School Improvement. *Journal of Staff Development*, 19(1), 52-54.
- Woolfolk Hoy, A., & Burke-Spero, R. (2000, April). *Changes in efficacy during the early years of teaching*. Paper presented at the American Educational Research Association, New Orleans, LA.
- Yin, R. K. (1994). *Case study research: Design and methods*. Thousand Oaks, CA: Sage Publications.
- Yin, R. K. & Campbell, D. T. (2002). *Case study research: Design and methods* (Vol. 5). Thousand Oaks, CA: Sage Publications.
- Yocam, K. (1996). Conversation: An essential element of teacher development. In C. Fisher, D. C. Dwyer, & K. Yocam (Eds.), *Education and technology* (pp. 265-279). San Francisco: Jossey-Bass.

**APPENDIX A**  
**OVERALL RESEARCH DESIGN STRUCTURE**

**OVERALL RESEARCH DESIGN STRUCTURE**

**APPENDIX B**  
**REQUEST FOR PARTICIPATION**

## REQUEST FOR PARTICIPATION

Dear 3rd-6th Grade Teachers,

I have met with a graduate student who will be conducting a survey online for her dissertation. Her name is Michanne Hoctor and she is a student in the Educational Technology Joint Doctoral Program at San Diego State University and the University of San Diego. She is interested in 3rd-6th grade teachers' perceptions of our professional development program in technology and how you have used the knowledge you gained through your participation in this program. All responses will be kept confidential.

Please take the time to complete the survey online when we send the link out next week. It shouldn't take more than 10-15 minutes to complete.

Thank you!

B.

**APPENDIX C**  
**INTERVIEW PROTOCOLS**

## **SITE ADMINISTRATOR INTERVIEW PROTOCOL**

1. Tell me about what you are doing to assist teachers to integrate technology into their classrooms. (Probe: literacy)
2. Tell me how you came to be involved in technology and curriculum integration. (Probe: What is your specific role in technology integration?)
3. Describe the technology integration support structures in place at your school site. How do these affect your teachers' ability to teach using technology?
4. When teachers integrate literacy and technology, do you (and they) focus on how technology assists children to learn? What are the literacy outcomes (Positive? Negative?) for this technology integration reform?
5. Please give 1-2 examples of technology use in literacy that you consider to be exemplary that you've observed recently in a teacher's classroom.
6. How has the use of technology as reform impacted either short range or long range planning at your school site?
7. Is there anything else you want included?

## FOCUS GROUP INTERVIEW PROTOCOL

3<sup>rd</sup> – 6<sup>th</sup> Grade Teachers:

1. Tell me about a recent experience using technology to build student literacy.
2. Talk about what has supported your integration of technology.
3. Talk about what has gotten in the way of your integration of technology.
4. Talk about your experiences collaborating with others around technology.

Tech. Core:

1. Tell me about the content for professional development this year.
2. Describe a typical professional development session.
3. Talk about the follow-up and feedback structures in place to support technology integration.
4. How are you measuring the impact this year's professional development is having on teaching and student learning?
5. Talk about the supports and challenges you've noticed teachers have faced this year with technology integration.



**APPENDIX D**  
**DISTRICT INFORMATION**

## DISTRICT INFORMATION

### 2004-2005 Facts about CITRUS HEIGHTS SCHOOL DISTRICT\*

\*CBEDS October 2004

#### NUMBER OF CHILDREN ATTENDING (By Grade)

- Preschool 3.4% 151
- Kindergarten 8.9% 394
- Grade 1 9.1% 404
- Grade 2 10.4% 459
- Grade 3 10.2% 453
- Grade 4 10.6% 470
- Grade 5 11.3% 502
- Total Elementary 63.9% 2833

- Grade 6 11.5% 510
- Grade 7 12.1% 536
- Grade 8 12.5% 554
- Total Middle School 36.1% 1600
- Total Enrollment 4433

#### NUMBER OF CHILDREN ATTENDING (Kindergarten – Eighth Grades by Gender)

- Male 51.3% 2198
- Female 48.7% 2084

#### NUMBER OF CHILDREN ATTENDING (By Race)

- Hispanic 40.4% 1730
- White 23.3% 996
- African-American 25.6% 1096
- Filipino 3.7% 159
- Asian 3.8% 163
- Pacific Islander 2.0% 84
- American Indian/Alaskan .7% 32
- Multiple Ethnicities .5% 22

#### NUMBER OF ENGLISH LANGUAGE (By Language) – October 2004

- Spanish 15.4% 659
- Somali 1.8% 78
- Vietnamese .5% 20
- Kurdish .4% 17
- Tagalog .4% 15
- Farsi .1% 6

- Other Languages 1.5% 65
- English Language Learners 20.1% 860
- English Proficient 79.9% 3422

NUMBER OF STUDENTS RECEIVING FREE OR REDUCED PRICE MEALS

- Free 1544
- Reduced Price 507

AVERAGE CLASS SIZE (Number of Children per Class)

- Kindergarten through 18.80  
Grade 3
- Grades 4 through 5 28.28
- Grades 6 through 8 26.69

NUMBER OF EMPLOYEES

- Certificated 245
- Classified 226
- Confidential 6
- Management 33

BASE REVENUE LIMIT (State Funding per Pupil)

- Citrus Heights \$4759
- State Average \$4776

NUMBER OF SCHOOL BUSES

- 48-Passenger or Greater 7
- 20 -35 Passenger 3
- 19-Passenger or Fewer 2

NUMBER OF STUDENTS TRANSPORTED

- Special Education (PreK-8) 94

NUMBER OF COMPUTER WORKSTATIONS

- Traditional PCs 1000
- WinTerms ("Thin Clients") 5000

NUMBER OF STUDENTS PER COMPUTER

- Ratio of Students per Computer 2:1

**APPENDIX E**  
**ONLINE SURVEY**

## ONLINE SURVEY

Thank you for your willingness to participate in this survey! My name is Michanne Hocter and I am a student in the Educational Technology Joint Doctoral Program at San Diego State University and the University of San Diego.

The findings of this survey will be published in my dissertation as a requirement of my graduate program, and may be published in a journal article or presented at a conference.

Your responses will be used to prepare a descriptive report of the implementation of the professional development program in Lemon Grove School District. I'm interested in teachers' perceptions of the professional development program and how you have used the knowledge you gained through your participation in this program. All responses will be kept confidential.

Please feel free to ask about the project. If you have any questions concerning the survey or the research, please contact me directly at 619-997-0615 or via [email](#). If you have any questions or concerns about your rights as a participant contact the [Institutional Review Board](#) at SDSU at (619) 594-6622 and/or the [Office of the Vice President and Provost](#), University of San Diego 5998 Alcalá Park, San Diego, CA 92110 (telephone: 619-260-4553).

At the end of the survey, you will be given the opportunity to volunteer for participation in a focus group interview. Questions will involve perceptions about, implementation of, and impact of the technology professional development and how technology has been used to support your literacy teaching. The focus group interviews will take place the week of May 9th for approximately 30 minutes, scheduled at your convenience. If you would like to participate in the focus group, please make sure to click on the link at the end of this survey. This will send me your contact information (separately from your answers to this survey) and sign you up for your choice of a gift card from Starbucks or Jamba Juice.

Again, thank you for your participation!

### 1. Grade

- 3rd Grade
- 4th Grade
- 5th Grade
- 6th Grade
- Support Teacher
- Other (please specify)

### 2. Years teaching:

- 1-3
- 4-7
- 8-10
- 11 - 20
- 20+

### 3. Years at this grade level:

- 1-3
- 4-7
- 8+

**4. Years in Lemon Grove School District:**

- 1-3
- 4-7
- 8+

**5. Which professional development group are you participating in?**

- Group 1
- Group 2
- Group 3
- Group 4
- Group 5
- Other (please specify) \_\_\_\_\_

**6. What is your student to computer ratio?**

- 2:1
- 1:1

7. Please respond truthfully to the items below by indicating how little or how much you agree with each one on a scale from Strongly Disagree to Strongly Agree.

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
A. I like to teach with technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B. Teaching with technology is fun.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C. I do not feel confident about teaching with technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D. My teaching with technology improves my students' reading and writing skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E. I have learned new tricks and better strategies for teaching with technology this year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
F. I have re-assessed how I teach with technology this year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G. I have not changed the way I teach with technology this year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H. I am not confident in talking about teaching with technology with peers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I. I am a leader in teaching with technology in my school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
J. I could train others how to teach with technology better.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
K. I design learning opportunities that integrate technology in order to support the diverse needs of my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
L. I do not use current research when planning for technology integration.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
M. I do not use technology resources, nor do I take the time to evaluate them for accuracy and suitability for my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
N. I plan for the management of the technology resources within my classroom/school site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O. I am aware of the technology standards for students and apply them when planning my curriculum.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
P. I use technology to develop students' higher order thinking skills and creativity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Q. I do not use technology in assessing student learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
R. I do not use technology to analyze student data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
S. I use technology to communicate student academic success to parents, collaborate with my colleagues, and/or to the larger community.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
T. I promote safe and healthy use of technology resources.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Besides the District professional development program, what influences your use of technology? Choose from the following list of possible reasons (please mark all that apply):

- A. Mentoring/coaching from another teacher/colleague.
- B. Outside training or experiences.
- C. Experience/training in other content areas.
- D. My own curiosity and pursuit of knowledge through reading, searching online, etc.
- E. Other (please specify)

**9. Please describe a recent experience implementing technology at your school site.**

**10. Which factors serve to *support* your implementation of the instructional strategies from the district technology professional development sessions? *Check all that apply***

- A. I have access to the necessary instructional materials at my school.
- B. My principal's instructional emphasis matches the technology professional development.
- C. My grade-level team's instructional emphasis matches the technology professional development.
- D. I have sufficient time to reflect on my instructional practice with technology at school.
- E. I receive appropriate feedback from my principal and/or other resource staff to support my professional growth using technology.
- F. The professional development activities available at my school site support my professional growth using and teaching with technology.
- G. I receive adequate support for the technology I use.
- H. Other (please specify)

**9. Please describe a recent experience implementing technology at your school site.**

**10. Which factors serve to *support* your implementation of the instructional strategies from the district technology professional development sessions? *Check all that apply***

- A. I have access to the necessary instructional materials at my school.
- B. My principal's instructional emphasis matches the technology professional development.
- C. My grade-level team's instructional emphasis matches the technology professional development.
- D. I have sufficient time to reflect on my instructional practice with technology at school.
- E. I receive appropriate feedback from my principal and/or other resource staff to support my professional growth using technology.
- F. The professional development activities available at my school site support my professional growth using and teaching with technology.
- G. I receive adequate support for the technology I use.
- H. Other (please specify)



11. What has been the most *helpful* in supporting your integration of technology?

12. Which factors serve to *impede* your implementation of the instructional strategies from the district's technology professional development? *Check all that apply.*

- A. I do not have access to the necessary instructional materials at my school.
- B. The instructional strategies from the technology professional development do not match my style of teaching.
- C. My principal supports a different instructional model.
- D. The featured instructional strategies were too advanced for my students or for myself.
- E. The featured instructional strategies were too easy for my students or for myself.
- F. I do not have sufficient time to plan for technology integration and/or implementation.
- G. Required testing and assessments take too much time away from teaching with technology.
- H. My students are academically higher than those shared in the technology professional development.
- I. My students are academically lower than those used in the examples given in the technology professional development.
- J. My students are more diverse than those as examples in the technology professional development.
- K. My students are less diverse than those examples given in the technology professional development.
- L. The technology is not available to me.
- L. Other (please specify) \_\_\_\_\_

13. Please describe what you see as the biggest *barrier* to your technology integration/implementation.

\_\_\_\_\_

14. Please list 3 software titles that had the greatest effect on student achievement? (If you cannot recall the titles, please describe what the software does.)

\_\_\_\_\_

15. How often (per week) are your students engaged with educational technology for each of the following purposes?  
(These are based on ISTE - NETS for Students Profiles)

	Every Day	Frequently	Often	Occasionally	Never
A. Use keyboards and other common input and output devices.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B. Discuss common uses of technology in daily life.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C. Discuss basic issues related to responsible use of technology and information.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
D. Use productivity tools and peripherals.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
E. Use technology tools (e.g., multimedia authoring, presentation, Web tools, digital cameras, scanners) for individual and collaborative writing, communication, and publishing activities.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
F. Use telecommunications efficiently to access remote information, communicate with others.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
G. Use telecommunications and online resources (e.g., e-mail, online discussions, Web environments) to participate in collaborative problem-solving activities.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
H. Use technology resources (e.g., calculators, data collection probes, videos, educational software) for problem solving, self-directed learning, and extended learning activities.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
I. Determine which technology is useful and select the appropriate tool(s) and technology resources to address a variety of tasks and problems.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
J. Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

16. From the following list, select 3 that you feel have the most significant effect on student achievement and rank order those three items only.

	1 = Most Important	2 = Important	3 = Fairly Important
A. Use keyboards and other common input and output devices.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B. Discuss common uses of technology in daily life.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C. Discuss basic issues related to responsible use of technology and information.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
D. Use productivity tools and peripherals.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
E. Use technology tools (e.g., multimedia authoring, presentation, Web tools, digital cameras, scanners) for individual and collaborative writing, communication, and publishing activities.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
F. Use telecommunications efficiently to access remote information, communicate with others.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
G. Use telecommunications and online resources (e.g., e-mail, online discussions, Web environments) to participate in collaborative problem-solving activities.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
H. Use technology resources (e.g., calculators, data collection probes, videos, educational software) for problem solving, self-directed learning, and extended learning activities.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
I. Determine which technology is useful and select the appropriate tool(s) and technology resources to address a variety of tasks and problems.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
J. Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**Collaboration**

17. In which areas do you feel you've had input (please select all that apply):

- A. Implementation of technology in your own classroom.
- B. Taking an active role in site implementation of technology.
- C. Giving suggestions for site staff development.
- D. Talking with grade level colleagues.
- E. Helping others integrating technology through observations, coaching, etc.
- F. Evaluating district staff development.
- G. Follow-up sessions to district staff development.
- H. Suggestions for future district staff development planning.
- H. Other (please specify)

**Collaboration**

18. Please describe 1 or 2 things you've done with technology in your teaching over the past few months.

19. What would you like to do with technology that you are not able to do now? What would you need in order to accomplish this?

20. Please add any additional comments about the district's technology professional development and implementation that you feel are pertinent.

Thank you for your time and input on this survey.

If you would like to participate in the focus group interview occurring the week of May 9th, please send me your contact information via email by selecting either Starbucks or Jamba Juice as a thank you for your participation in the focus group. You will receive your gift card at the group interview.

Thank you again for your time and input!

**APPENDIX F**  
**RESEARCH SUPPORT**

## RESEARCH SUPPORT

### Research Question & Data Support

<b>RESEARCH QUESTION ONE - WHAT ARE THE COMPONENTS OF THE TECHNOLOGY PROFESSIONAL DEVELOPMENT USED IN THIS DISTRICT?</b>	<b>INTERVIEW DATA</b>
What was the content of the technology professional development program?	Dir. Project LemonLink
What structures, or formats, were used within the technology professional development program and within each session?	Dir. Project LemonLink
How was the technology professional development program facilitated?	Dir. Project LemonLink
What changes in resources occurred for and within the technology professional development program?	Director, Info Serv.
How does the district measure the outcomes of their technology professional development program?	Dir. Project LemonLink Administrators

<b>RESEARCH QUESTION TWO - HOW DO TEACHERS PERCEIVE THEIR ABILITY TO USE TECHNOLOGY AND APPLY IT IN THEIR TEACHING IN ORDER TO PROMOTE STUDENT LITERACY LEARNING?</b>		
<b>Research Sub-Question</b> - What differences were noted in the teacher's ability to use technology, both professionally and with students in the classroom?		
<p><b>Survey Data</b>  <i>Section 2 - Technology Confidence</i>            Q7 – Likert Scale:            A. I like to teach with technology.            B. Teaching with technology is fun.            C. I do not feel confident about teaching with technology.            D. My teaching with technology improves my students' reading and writing skills.            E. I have learned new tricks and better strategies for teaching with technology this year.            F. I have re-assessed how I teach with technology this year.            G. I have not changed the way I teach with technology this year.            H. I am not confident in talking about teaching with technology with peers.            I. I am a leader in teaching with technology in my school.            J. I could train others how to teach with technology better.            K. I design learning opportunities that integrate technology in order to support the diverse needs of my students.            L. I do not use current research when planning for technology integration.</p>	<p><b>Data Analysis</b>            Total score computed for overall technology confidence.   <i>t</i>-tests each item &amp; teaching experience, PD group, grade level             Chi-square each item &amp; outside influences on tech use</p>	<p><b>Interview Data</b>  <i>Administrator Interviews:</i>            What changes have you noted in the literacy instruction of those teachers from your school who attended this district's technology professional development this past summer or through this year?            Describe one or two examples of technology use in the third through fifth grade classrooms</p>

Table continues

<p>M. I do not use technology resources, nor do I take the time to evaluate them for accuracy and suitability for my students.</p> <p>N. I plan for the management of the technology resources within my classroom/school site.</p> <p>O. I am aware of the technology standards for students and apply them when planning my curriculum.</p> <p>P. I use technology to develop students' higher order thinking skills and creativity.</p> <p>Q. I do not use technology in assessing student learning.</p> <p>R. I do not use technology to analyze student data.</p> <p>S. I use technology to communicate student academic success to parents, collaborate with my colleagues, and/or to the larger community.</p> <p>T. I promote safe and healthy use of technology resources.</p> <p>Q8. Besides the District professional development program, what influences your use of technology?</p> <p><i>Section 3 – Site Implementation;</i></p> <p>Q9. Please describe a recent experience implementing technology at your school site.</p> <p>Q14. Please list 3 software titles that had the greatest effect on student achievement?</p>	<p><i>t-Test - Q8 Influences &amp; Teaching Experience</i></p>	<p><i>Focus Group Interviews:</i> What teaching practices have you changed or will you change as a result of your experience in this district's technology professional development?</p>
<p><b>Research Sub-Question</b> - What enabled teachers to implement the new skills and strategies, or knowledge developed within the technology professional development?</p>		
<p><b>Survey Data</b> <i>Section 3 – Site Implementation</i></p> <p>Q10- Which factors serve to support your implementation of the instructional strategies from the district technology professional development sessions? Check all that apply.</p> <p>Q11. What has been the most helpful in supporting your integration of technology?</p>	<p><b>Data Analysis</b> Frequencies each item <i>t</i>-tests each item &amp; teaching experience, PD group, grade level</p>	<p><b>Interview Data</b> <i>Administrator Interviews:</i> What are the events or contexts that appear to facilitate teachers' change process?  <i>Focus Group Interviews:</i> What site structures support or impede your implementation of technology?</p>
<p><b>Research Sub-Question</b> - What barriers kept teachers from implementing the new skills and strategies, or knowledge developed within the technology professional development program?</p>		
<p><b>Survey Data</b> <i>Section 3 – Site Implementation</i></p> <p>Q12- Which factors serve to impede your implementation of the instructional strategies from the district's technology professional development? Check all that apply.</p> <p>Q 13. Please describe what you see as the biggest barrier to your technology integration/ implementation.</p>	<p><b>Data Analysis</b> Frequencies each item <i>t</i>-tests each item &amp; teaching experience,</p>	<p><b>Interview Data</b> <i>Administrator Interviews:</i> What are the events or contexts that appear to impede teachers' change process?</p> <p>Table Continues</p>

	<p>PD group, grade level</p>	<p><i>Focus Group Interviews:</i> What site structures support or impede your implementation of technology?</p>
<p><b>Research Sub-Question -</b> What were the characteristics of collegiality and/or collaboration between teachers?</p>		
<p><b>Survey Data</b> <i>Section 4 – Collaboration</i> Q17. In which areas do you feel you've had input?</p>	<p><b>Data Analysis</b> Frequencies each item <i>t</i>-tests each item &amp; teaching experience, PD group, grade level</p>	<p><b>Interview Data</b> <i>Administrator Interviews:</i> How would you change this district's technology professional development to maximally impact your teachers' practices? Describe the technology integration support structures currently in place at your school site.  <i>Focus Group Interviews:</i> Talk about your experiences in this district's technology professional development. What are your suggestions for future collaboration-coaching professional development trainings?</p>

**APPENDIX G**  
**PARTICIPANT CONSENT**



## PARTICIPANT CONSENT

Participants were emailed the web link to participate in the online survey. They were directed to the following page:

Thank you for your willingness to participate in this survey! My name is Michanne Hocter and I am a student in the Educational Technology Joint Doctoral Program at San Diego State University and the University of San Diego.

The findings of this survey will be published in my dissertation as a requirement of my graduate program, and may be published in a journal article or presented at a conference.

Your responses will be used to prepare a descriptive report of the implementation of the professional development program in Citrus Heights School District. I'm interested in teachers' perceptions of the professional development program and how you have used the knowledge you gained through your participation in this program. All responses will be kept confidential.

Please feel free to ask about the project. If you have any questions concerning the survey or the research, please contact me directly at 619-997-0615 or via email @ mhocor66@mac.com. If you have any questions or concerns about your rights as a participant contact the Institutional Review Board at SDSU at (619) 594-6622 and/or the Office of the Vice President and Provost, University of San Diego 5998 Alcalá Park, San Diego, CA 92110 (telephone: 619-260-4553).

At the end of the survey, you will be given the opportunity to volunteer for participation in a focus group interview. Questions will involve perceptions about, implementation of, and impact of the technology professional development and how technology has been used to support your literacy teaching. The focus group interviews will take place within the next two weeks for approximately 30 minutes, scheduled at your convenience. If you would like to participate in the focus group, please make sure to circle your choice of thank you gifts (a gift card for Starbucks or Jamba Juice) at the end of this survey. Please include your contact information (at the bottom of this survey). Your responses will be separated from your information for research purposes.

Again, thank you for your participation!

**APPENDIX H**  
**TECHNOLOGY CONFIDENCE SCORES**

**TECHNOLOGY CONFIDENCE SCORES**

Participant	Total Technology Confidence Score
1	60
2	72
3	74
4	93
5	94
6	90
7	67
8	69
9	52
10	69
11	81
12	100
13	75
14	72
15	76
16	75
17	98
18	94
19	74
20	88
21	79
22	99
23	93
24	82
25	0
26	64
27	73
28	66

**APPENDIX 5**  
**TECHNOLOGY INTEGRATION WEB**  
**RESOURCES**

## TECHNOLOGY INTEGRATION WEB RESOURCES

**The WebQuest Page** (maintained by Bernie Dodge)

<http://edweb.sdsu.edu/webquest/webquest.html>

Information about what a WebQuest is, how to create one, and many examples of WebQuests.

**WebQuest Info Page**

<http://www.surfaquarium.com/webquest.htm>

**Funderstanding**

<http://www.funderstanding.com/constructivism.cfm>

**George Lucas Educational Foundation and Edutopia**

<http://www.glef.org/>

a Subscribe to newsletter: <http://www.glef.org/subform.html>

b Subscribe to e-newsletter: <http://www.glef.org/blast.html>

**Eduscapes**

<http://www.eduscapes.com/> from Annette Lamb

**Virtual Field Trips**

<http://www.surfaquarium.com/virtual.htm>

This web site provides links to many virtual field trips that are appropriate for classroom use.

**<http://www.goals.com/index.htm>**

Explorers of all ages are invited to join us on a growing list of educational adventures with an emphasis on science, technology and nature. Our adventures and acronym 'GOALS' are intended to inspire readers to establish and strive for goals of their own.

**Technology in the Classroom Resource Page**

[http://www.ccclearn.com/resources/tech\\_in\\_class.html](http://www.ccclearn.com/resources/tech_in_class.html)

**Classroom Connect**

<http://www.classroom.com>

**2Learn.ca** (a GREAT site with tons of resources about technology and education)

<http://www.2learn.ca/>

**Computer Teaching Tips**

<http://www.emunix.emich.edu/~krause/Tips/>

**TechLearning.com**

<http://techlearning.com>

**Knowledge Integration Environment (Science)**

<http://www.kie.berkeley.edu/KIE.html>

**Computer Supported Intentional Learning Environments**

<http://csile.oise.utoronto.ca>

**Apple in Education** (includes Apple Classrooms of Tomorrow)

<http://www.apple.com/education/k12/>

Apple computer provides ideas for using computers for learning as well as a look to what technology might be used for in the future.

**AT&T Learning Circles**

<http://www.learn.org/circles/lcguide/>

The learning circles guide provides help for developing cross-classroom collaboration using telecommunications.

**Microsoft in Education** (provided by Microsoft)

<http://www.microsoft.com/education/schools/default.htm>

**Learn Online with ACTDEN**

<http://www.actden.com/>

**Educational Technology Resources** (provided by Federal Resources for Educational Excellence--FREE)

<http://www.ed.gov/free/s-edtech.html>

**Kathy Schrock's Guide for Educators** (sponsored by Discovery Online)

<http://school.discovery.com/schrockguide/>

**Teams Distance Learning for K-12 Educators**

<http://teams.lacoe.edu/>

**SchoolWorld Internet Education**

<http://www.schoolworld.asn.au/welcome.html>

<http://www.schoolworld.asn.au/schoolworld.html>

**Teaching With Technology (University of Minnesota)**

<http://www.tc.umn.edu/~rein0012/teaching3.html>

Links to resources, tools, scaffolds and enabling contexts (submitted by Ted Baechtold)

### **Online Games and Activities**

#### **1 Quia**

<http://www.quia.com>

**over 400,000 activities!**

#### **2 Brain POP**

<http://www.brainpop.com>

**animated movies about health, science and technology; also has activities and**

#### **3 Fun Brain**

<http://funbrain.com>

**games and quizzes for grades K-8**

#### **4 4Kids.org**

<http://www.4kids.org/funstuff/>

**"Your link to the latest techKNOWLEDGEy on the web" - a list of activities**

#### **5 A game a Day**

<http://www.agameaday.com/>

**an award-winning site where you can find brainteasers, games, puzzles, and other fun activities that not only entertain, but also educate**

#### **6 Alf: The Kid's Portal Playground**

<http://alfy.com>

**cool site for grades preK-3**

#### **7 EdHelper.com**

<http://edhelper.com/>

**build different types of puzzles including word finds, crosswords, spelling puzzles, and math puzzles**

### **Online Communities for Teachers**

#### **1 EducatorsNet**

[www.educatorsnet.com](http://www.educatorsnet.com)

#### **2 newteachers.com**

[www.geocities.com/~newteach/](http://www.geocities.com/~newteach/)

**3 Might Media** (an educational network)

[www.mightymedia.com/ttalk/index.asp](http://www.mightymedia.com/ttalk/index.asp)

**4 WAC@NIU** (provided by NIU English Department)

[www.engl.niu.edu/wac/journal.html](http://www.engl.niu.edu/wac/journal.html)

**5 Internet Learning Forum** (for math and science teachers)

<http://ilf.crlt.indiana.edu/>

**6 Online Teacher Professional Development Institute: TAPPED IN**

<http://www.tappedin.sri.com>

**7 Teachers Helping Teachers**

<http://www.pacificnet.net/~mandel/>

**8 Distance Learning Resources and Course Sharing**

<http://CourseShare.com>

**9 BigChalk.com**

<http://bigchalk.com>

**online community for teachers with tools for creating webpages, chats, calendars, tests, quizzes, etc.**

**10 iUniverse Communities**

<http://communities.iuniverse.com/bin/category.asp?cid=4>

**Tools for creating class websites and other online class tools**

1 <http://www.myclass.net> (beta test Web courseware)

2 <http://iteach.com> (create webpages, WebQuests, calendars-full membership \$29.95 for 1st year)

3 <http://myschoolonline.com> (create a class webpage with a secure grade book)

4 <http://www.school.aol.com/> (gives schools free email, search filters, and other safety controls)

5 <http://www.babylon.com> (create and use online glossaries)

6 <http://www.homeroom.com/> (hosted by Princeton Review-create tests and quizzes designed to assess student achievement based on local standards)

7 <http://bigchalk.com> (online community for teachers with tools for creating webpages, chats, calendars, tests, quizzes, etc.)

**Assistive Technology Links**

Assistive technology helps people with disabilities use technology. It might involve adapting a piece of equipment or designing a lesson or instructional material in a particular way so that it is accessible to all students, regardless of disability. The following links provide information about how technology can be used with students with disabilities of varying types.

**1 Alliance for Technology Access**

<http://www.ataccess.org/>

**2 Assistive Technology Educational Network of Florida (ATEN)**

<http://www.aten.ocps.k12.fl.us>

**3 Assistive Technology Viewer**

<http://natri.uky.edu/resources/viewer/wel.html>

**4 The BASICS of Adaptive Technology**

<http://www.rit.edu/%7Eeasi/ak12/k12/k12basics.html>

**5 Center for Applied Special Technology**

<http://www.cast.org>

**6 MC2 Learning Systems, Inc.**

<http://www.mc2learning.com/>



## ABSTRACT OF THE DISSERTATION

Investigating Professional Development in Technology for Literacy Teachers

by

Michanne Hocter

Doctor of Education

San Diego State University, 2006

Citrus Heights (a pseudonym) School District is an award-winning exemplar of technology integration. This small urban district has focused its resources on the re-design of its K-8 classrooms and curriculum to support educational reform through the use of technology, including hardware, software, and teacher professional development.

Current best practices suggest that while staff development may begin with conventional in-service training, it should move quickly beyond to efforts that support teachers' development as professionals involved in decision-making, inquiry, and leadership in their classroom teaching. In order to develop as professionals, teachers specifically need help and support in integrating new knowledge and skills into their classroom practice. The case data offer valuable support for theorizing about teachers' professional development in technology that characterizes the professional literature. Another important aspect for this study is that teachers' professional development in technology may well serve to further larger goals of school reform. This is addressed in a discussion of what was observed to be the infrastructure that was created to support teachers' continuing development in technology within the district studied. Attention must be paid to this infrastructure both to understand and to affect the kind of change necessary for school reform.

This case study investigates the efficacy of the technology educational reform movement in this district. Using both qualitative and quantitative methods, the researcher collected data focusing on the factors in professional development that support or impede 3<sup>rd</sup> – 6<sup>th</sup> grade classroom teachers' meaningful integration of technology and literacy. Five broad themes emerged from the data – multi-layered, adaptive, progressive, responsive, and collaborative. This study offers a preliminary analysis of professional development structures and may be used as a guide by administrators and teacher educators.