The Professional Development Trajectories of Teachers successfully integrating and practicing with New Information and Communication Technologies

By

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Abstract

This dissertation is a qualitative study that examines expert teacher's trajectories of professional development (PD). Interviews across 39 participants produced data in the form of life-narratives revealing perceptions of growth across the teachers' careers. Using a life-narrative methodological approach (McAdams, 2011), these data were used to inform themes of beginning, transformation, and experiences of PD. Narratives were then organized based on similarities across cases. Findings include unique aspects of teacher training across cases, multiple trajectory types toward expert practice, and teacher perception of relevance for different PD experiences.

Chapter 1: Introduction

> "We seem to be stuck … arguing over which factory-age solutions we should try without fully understanding the implications of the context we are in and the new functions we need education to perform."
> –Trace Pickering (2012)

Introduction

Multiple pressures to change have been brought to the doorstep of leaders and teachers working in the public school system. Current policy initiatives are grounded in research-based proven practices, yet the desired transformations toward either a standardized school system or a 21st Century model of differentiated, constructed learning at scale are still waiting for professional development (PD) that produces the innovative practices needed. Research, to this point, has assumed that we have a foundational understanding (Desimone, 2011) of how to train and provide ongoing professional development to adult learners; I argue that this foundation is shifting. The purpose of this study is to uncover emergent *positive* resources that are relevant to exemplary practitioners that were not part of constructing our understanding of PD in the past.

Teaching and learning are being essentially transformed due to the rise and availability of information and communication technology (ICT). Each year we award a collection of exceptional teachers awards for being innovative teachers. These teachers are nominated, filtered, and vetted for classroom

talents and practices we are attempting to train for and warrant careful examination of their trajectories of professional growth over time. By trajectories, I am referring to the direction that a teacher takes, moving from novice to expert practice over time, due to the influence of a full range of experiences, people, and tools that formally and informally influence their practice. Trajectories can shift when the teachers goals and beliefs have them redirect their practices and seek out or use a variety of PD resources to learn new ways to design, invigorate, and grow in their professional practice.

This study profiles 39 national award-winning teachers, and captures their narratives to show us what their PD looked like, how to reconsider traditional assumptions of PD, and introduce practices that help us build and foster these kinds of teachers across our schools. I used current claims found in the literature to build the interview protocol and provide cognitive prompts to the teachers to tell their stories, then applied a two stage life-narrative analysis to reveal themes among and patterns across narratives (McAdams, 2011).

I found that award-winning teachers:

1) Are not necessarily being trained in traditional certification programs,
2) Instead of modeling a single PD path, present four equally productive PD trajectories of growth,
3) Value informal and digitally mediated PD resources as more relevant than traditional PD toward innovative practices,

4) Value the importance of digital tools, but that innovation is not caused or sustained by them, and they
5) Held effective leadership practice as conditional, or at least generative, for innovative practice to occur.

Finally, I will provide an overview of how these findings can influence the development of certification and PD programming for teachers and implications for school leaders seeking to foster exceptional teaching that leverages relevant ICT tools and practices.

This chapter provides an overview of why we need to be talking to innovative teachers to better understand PD. Prior to interviews with the teachers, I review a nationwide call for highly qualified practitioners found in the literature. This need is driven by competing needs to both standardize practice and to innovative practice – both agendas require effective teacher PD. I also review the collective frustrations of reformers that mistakenly assume 'teacher resistance', or failed PD efforts, prior to examining effective PD and resort to 'drop-in' technology or continually try new PD programs amounting to a 'revolving door' of misdirected PD agendas, yet also present a clear need for research that assumes the best of teachers, their natural PD tendencies, and building PD systems that respond to, (rather than force), teacher interest, motivation, and

eventual innovation. This chapter closes by clarifying the need for a clear understanding of successful trajectories of professional development.

The Standardization Agenda

The standardization of schools is a central starting point for the need for 'highly qualified teachers' and also helps set the stage for why this goal is so elusive, or even impossible, according to current federal education agenda. Over the last eleven years, schools have responded to the new responsibility of 'No Child Left Behind" (NCLB, 2008). As schools create common measures and codify common solutions to common learning, emergent digital technologies have nurtured a growing call for specialized skills with specialized tools toward innovative learning. Both standardization and digital emergence ask educators to reassess their function. For either agenda to move forward at scale, both require thousands of educators to reconsider how they have always done school. If there are '21st century' needs for student learning, the most direct path to large-scale change is to consider 21st century needs for teacher training and professional development.

NCLB called for the creation of 'basic standards' to be organized and agreed on by educators across the states. These standards would then be tested and measured for each student, school, and state. NCLB is based on the premises that all children learn, that math and reading capacities define

‘learning’, and that schools should be held accountable to the degree that each student attains ‘basic’ proficiency in those particular subjects.

NCLB requires schools to test and measure each student and publicly release proficiency levels. The ‘basic standards’ transformed into ‘core standards’ and today schools are expected to report ‘Adequate Yearly Progress’ (AYP) for each demographic group of students based on these standards. Codifying a common definition of ‘progress’ meant that schools could be measured, tallied, and controlled through funding based on success or failure to teach what were originally ‘basic’ standards.

Massive amounts of data are now collected consistently across the country. Technology has facilitated the collection and dissemination of NCLB data at scale. In addition to AYP, data can easily include attendance tallies, graduation rates, and anything else that can be counted. Many schools have financed diagnostic tests (NWEA, 2012) to provide further ongoing data to teachers in 24-72 hours of testing. With growing piles of data, a progressive interest in summative interpretations of the data is natural.

The Department of Education now has a “What Works Clearinghouse” (WWC, 2012) for school leaders to have a summary of studies linking a host of programs and practices to AYP. The WWC has standardized solutions for improving schools including ‘what works’ for English Language Learning, Academic Achievement, School Choice, School Organization and Governance,

Early Childhood Education, Teacher Incentives, and Personal/Social Development. WWC claims 'what works' in schools based on evidence of AYP performance – they have a code of practice rooted in research connecting AYP measures to school programs, policies, and practices.

Schools failing to meet AYP have a 'clearinghouse' of solutions to implement where progress is measured in reading and math scores each year. With a common measure of success, with common data, common solutions make perfect sense to those that want guaranteed success. Once educators accept AYP as relevant, respect the funding and government support attached to it, or simply acknowledge the community pressure AYP scores engender, the question of school improvement converges on agreed upon 'codes' for improving math and reading. Advocates of such an approach ask:

- *Why attempt innovative solutions, when 'well researched' ones are available online?*
- *Why risk failed attempts when the stakes are so high?*
- *Why wouldn't school leaders and teachers simply do 'what works'?*

These questions, and the implicit assumptions of standardization and transferability in such sweeping 'solutions' leave much to be desired.

There is no shortage of critiques of NCLB and the standardization effect on schools; some of which frame standardization as ultimately "disastrous" (Rentschler, 2006). Notably, the shortfalls were fairly predictable after earlier

efforts in Texas (Valenzuela, 2005). Critics point out that high-stakes testing has adverse effects on schools, students, and the community of learning over time; potentially even creating an incentive economy for *cheating* instead of educating (Levitt & Dubner, 2005). Standardized solutions are fatally hard to empirically 'prove' across settings, with distinct local populations, and unique needs. Solutions at the local setting require leaders to work toward *diverse* learning settings (Darling-Hammond, 2007) using local strategies that best leverage effective change (Kelley & Shaw, 2009). Also, outside of schools, the context of the workplace is increasingly popularized as flat or shifted (McLoed, 2011) to include a need for *more* than basic reading and math skills.

Moreover, this trend uses scoring of basic skills to *compare* schools. Schools are compared publicly to other schools – raising the stakes on local competition. States are compared to each other causing a competition between them and a talking point for policy arguments. Finally, in many of these calls to action, American scores are compared to other countries because of a growing sense of global competitiveness (Friedman, 2005).

NCLB, as a systemic change, has had the natural outcome of a standardization of practice – or a 'codification of learning'. Schools are given strong incentives to follow a single set of solutions, or 'best practices' to a narrow set of prescribed outcomes determined with a very basic understanding of what learning is desired (basic math and reading). Long standing efforts to standardize

learning experiences include packaged curriculum, discipline programs, PD, scripted teaching of content, 'same page' delivery of content across classrooms, and other means to systemically control the process of learning so data can inform choice, programs, and adjustments can be made at scale.

Standardization of practice is regarded as both good and bad – depending on underlying epistemology and curricular goals. For those wanting education dollars to create a population of graduates that can do basic reading and math, progressive standardization is welcomed along with normative studies that filter out less effective practices for more effective practices. Like Dewey (1910), I agree that learning is more than the "accumulation" (pg 52) of information; it is broader than basic reading and math scores. Standardization is suspect of pushing out other essential learning that needs to take place. Teaching reading and math, though important, are not sufficient to prepare students for the 21st century workplace.

Finding the Highly Qualified Teacher

NCLB left another legacy. In Title II of the law, it states that each and every classroom in the country needs a "highly qualified" teacher by the end of 2005-2006. The law began a broader discussion that still stirs. What is a highly qualified teacher? What constitutes measurable credentialing, experiences, or training that equips a teacher? What roles do teachers play in reform? What

teachers are needed today?

It should come as no surprise that a call for teacher excellence has gained progressive strength recently. In order to codify learning effectively, teachers need to be willing to maximize programs they are given, provide minor local adjustments, and serve as data agents for the schools. Programs brought to a school must still be delivered as designed or they won't get the results desired. For these scholars, teaching and learning are still a 'black box' (Black & William, 1998) filled with teachers that need to be taught to comply – to mind the gap - (Mockler & Groundwater-Smith, 2009) for proper delivery of standardized programs - teacher excellence is equated to obedience.

In order to enter into innovative practices, pedagogies, and use new information and communication technologies (ICT) to facilitate relevant learning experiences teachers need to be doing much more than complying with prescribed programming. Neo-constructivist thinking calls for teachers that innovate & collaborate (Alozie, 2010), build instructional capacity (Murray, 2008), use ICT resources (Mumtaz, 2000), and process individualized data for differentiated instruction (Tomlinson & McTighe, 2006).

ICT is central to both the heavy use of data needed for standardized programming and practice *and* the introduction of relevant workplace skills that require digital production, creation, collaborative thinking, and other '21st century skills' - further defined in the next chapter.

Teacher professional training is a core challenge for effective leadership, teaching practice, technology integration, or any reform effort placed before schools, because teachers ultimately create the classroom as context. Efforts to understand the population of teachers, their needs, beliefs, and natural learning habits will positively inform efforts to transform schools. However, as I will show, when glossed over, this PD can be misplaced, misunderstood, and end in frustration. For either standardization or innovation, the role of teaching and the demands of teachers have expanded and PD is needed to shape the practice - but how? What might this look like?

The role of PD is central and complicated with a population of teachers that, some argue, is smaller and more transient. For instance, The Teaching Commission (Gerstner, 2006) gathered governors, business leaders, and superintendents (oddly, no teachers) to look carefully at measures of quality teachers, they called 'vital signs'. They noted that less top performing students were entering teaching, and that close to 46% of teachers were dropping out of the profession after 5 years. Because of these challenges, they called for redesign of teacher preparation programs, licensing, and licensing school leaders to hold teachers accountable with new compensation practices and the capacity to terminate unsatisfactory teachers. The teaching commission, though with noble intent, suggests changes because of challenges without a clear picture of what works within the scope of all the new demands placed on the profession.

Current expectations of teachers have grown beyond traditional mastery of curriculum design, pedagogy, and methods. Some expect teachers to become active policy makers too,

> "Transforming schooling in the twenty-first century depends on education policies being supported by expanded teacher participation in education policy-making, more coherent governmental policies across agencies." (Collinson, et al., 2009)

Also, teachers need to be community members with each other (Alozie, 2010), online (Barab, MaKinster, & Scheckler, 2003), and with families and communities (Sheldon & Epstein, 2002). This list could expand… the point is that while we seek different practices from teachers; we also expect expanded expertise in those practices. No simple program, tool, or application can prepare teachers for these demands.

All to often needs for change are identified (above) and teachers are expected to accept the premises and identified needs (standardized or innovative?), adopt new beliefs and practices (obey or transform?), and perform with excellence without any significant changes in traditional teacher training and PD. Teacher certification and professional development models have received less attention than needed. What may be poor systemic design can easily explain why practices are not changing as quickly as reformers desire. Given the explosion of new technologies available for information and communication

(central to most workplaces), this is often akin to asking a master carpenter to reprogram a laser cutter – then calling her 'resistant' to reforms when she chooses to continue using the table saw to meet daily workplace demands. The idea of resistance confuses the problem and distracts from the core need to understand professional development needs of teachers.

Resistance to change

Over the last twenty years, a convenient stereotype has presented itself. It suggests that 'teacher resistance' is the reason for limited change – and possibly a reason not to invest in effective PD reform - implying that teachers in general are decidedly outdated and skeptical. Instead of designing better, user responsive PD, we have an embarrassing history of investing research efforts to identify *why* teachers don't respond to poorly conceived, traditional PD programming. Instead of assuming all teachers can learn, and *want* to learn, (as we now consider foundational for student learning design), we assume they are resistant. Why?

Lyn Dawes' (1999) study of popular images of teachers, found it common to present teachers as fearful, inept, or less capable than students; especially around technology. Some argue that teacher resistance is a historical and reasonable phenomena (Cuban, 2010) or, in times of drastic change in the culture, resistance is actually a *useful* design in the system (Postman, 1979).

Neither fully establishes that teachers actually *are* resistant to professional growth and lifetime learning, nor that resistance is causing delays in reform.

Reasons for resistance, even if not showing causation, are a popular focus for theory and study. Resistance to change efforts appear to be resistance to technology itself (Robertson, et al., 1996); resistance to the "de-skilling of teachers" (Apple, 1991, 1993); resistance to the "hidden costs" of technology (Monke, 1997); to "outsiders" meddling in school affairs (Cuban, 1993; Olson, 1981); or simply a lack of time to do things right (OTA, 1995). Seemingly teacher resistance is more complex than Dawes' cartoon images. One gets the sense that instead of improving the pedagogy, or checking the relevance of the curriculum, PD designers are more than ready to blame the learners. Without a better framework for understanding *natural* teacher professional development trajectories, the needs of teachers, or what actually is effective and relevant to expert teachers, what may be a mismatch of method, topic, or timing appears to be resistance. Later data in this study will show that innovate teachers are not resisting traditional PD, they are being compliant, obedient, and patient with PD programming that is largely irrelevant to their expert PD trajectories.

If we accept resistance as a reality, then PD can be framed as a remedy for problematic practices rather than a healthy ongoing practice that helps professionals move from novice to expert practitioners. Some simply call for teachers to 'question', unlearn, and discard their current, deeply rooted

understandings of teaching, learning, and subject matter in order to improve practice (Cohen & Barnes, 1993). Why? Change to what? What did their certifications 'deeply root' that needs changing? And why does this change agenda not point more directly at the certification programming that roots these 'understandings' to start with?

Schools are left with the challenge of finding exceptional practitioners and models of teaching (Albion & Ertmer, 2002). But where? Who? How do we present these new models of practice to teachers? One suggestion is to integrate new technology into classrooms by embedding new practice into previously valued old practices (Ertmer, 2005). So instead of addressing resistance or a mismatch in PD, we might *trick* teachers into new learning? What happens when they grow wise to these PD efforts?

Before we move forward with building a user-centered foundation for PD resources in this study, I believe it helps to look briefly at the outcomes of resistance-assuming, or top-down, PD agendas. Instead of a clearer understanding of the design and leadership needed for certification and PD, assumptions of resistance misdirect our attention and provide a shaky foundation for moving forward. They also explain more clearly what is the 'revolving door' of PD and why leaders would choose 'drop-in' technology instead of considering new untried PD models. In the absence of user-centered designs for PD, leaders are left to trust models that consistently miss the mark. This trend further clarifies

the need for a study of expert trajectories of PD, and the follow-up design and development of relevant PD models for 21st century.

Revolving Door PD

NCLB provides strong incentive to meet increasingly challenging AYP goals each year. Instead of widespread resistance to standardization, schools seek out the best of competing claims to best practices, programs, and policies. In fact, the challenge is not for schools to accept change, but to *select* and focus on one reform agenda. The call for 'instructional program coherence' (Newmann, Smith, Allensworth, & Bryk, 2001) is a response to a revolving door of PD strategies. No one PD strategy is particularly bad, and in an effort to improve AYP, school leaders struggle to say 'No' to reform programs that claim results. When the results fall short however, the blame is placed not on the program, but on the administration and fidelity of the delivery of it.

The Chicago school reform efforts marked this phenomena in what Newman et al (2001) call a "Christmas tree" innovation (pg 298) that adds programs each year that all seem good, but together they create a patchwork that does not really have a longitudinal continuity – worse, they are not particularly effective (Bryk, Camburn, & Louis, 1999).

Schools struggle today for a clarity of vision and focus – making this goal the first step in nearly all school change process agendas (Elmore, 1996; Kelley

& Shaw, 2009; Smylie & Hart, 1999). This need for focus implies that schools are struggling from a lack of focus.

Drop-in Technology

Another common solution for school leaders has been to buy, what I call, 'drop-in technology' and hope for the best. Yet, simply buying digital tools for education has not shown long terms gains. For instance, laptops have shown increased motivation, increased attendance, and improved academic performance, but the gains are short-lived and hard to quantify (D. Fisher & Stolarchuk, 1998; Gardner, 1994; Lowther, Ross, & Morrison, 2003); laptops also appear less predictive when key factors like teacher training, access, and positive teacher attitudes were accounted for (Penuel, 2006).

The largest example of drop-in technology is that of interactive whiteboards. Whiteboards have sold over one million units in the last two years, with both school and government support, yet there remains limited research showing impact on student learning (Moss, et al., 2007). When teachers are not provided models and PD for innovative practice, they generally do not. Yet virtually all teacher-users adopt them enthusiastically (Kennewell, 2006) and mildly facilitate more interactive teaching styles (Armstrong, et al., 2005). In these cases, when less money is spent on training and support than the hardware itself (Means & Olson, 1997), the mediocre results are predictable.

Drop-in technology plays well in the public however. Schools can claim progressive effort and show they are pro-actively funding school competitiveness and NCLB challenges. This is marked by spending money without actually addressing quality professional development. Yet training can easily be packaged with technology purchases (Hoy & Hoy, 2006). School boards and leaders, not knowing themselves what PD should look like have entertained an entire industry of corporate training for schools and certification programs – packaged, easily delivered, 'proven', and efficient.

Research of such efforts is marked with initial excitement followed by minimal transformative change (Belanger, 2002; Hu, 2007; Lowther, et al., 2003). Why would leaders do this? Are leaders resistant or evasive to change? Or possibly these are *not* inept leaders, but leaders without strong or proven models of PD available under the annual pressure to meet NCLB benchmarks. These leaders are looking for positive public action with potential or real negative AYP numbers coming each summer. Leaders are also waiting for models of practice they can see and PD that helps them mirror; this is not resistance, its patience.

This is the core of the professional development challenge. In the absence of a clear solution, but in the presence of a leadership and teaching crisis, drop-in technology looks better than no technology. Anything is better than nothing. Poor, untested, and minimal PD resources with limited empirical results are simply better than wishful thinking. These decisions for PD are made at the theoretical

and school leadership level, but deeply distracts the needed inquiry into effective professional development trajectories and models of practice.

Addressing the Professional Development challenge

Because of recent trends toward codification of practice, the call for teaching 21st century skills, and rapidly growing ICT, the roles and expertise expected in the classroom have expanded. Teacher training and professional development remain a key factor for reform efforts. Not knowing how 21st century skills are affecting teacher PD, I ask first "How does the current literature conceptualize effective PD and trajectories of experience within teacher PD?"

Teacher training and professional development (PD) remain "the most serious unsolved problem" in American education (Sykes, 1996). I agree and argue further that the demands and needs of PD for expert practice are changing because there are new and digitally mediated trajectories of learning for teachers that are largely unexplored. My own experience with teachers and school leaders was that they were wiling and enthusiastic about emergent ICT, *not* resistant. My work toward the integration of digital gaming in the classroom consistently pointed toward a deeper look at professional development for teachers who liked the potential of games, but felt unready to use them professionally.

PD time for teachers is thin because their role has expanded. Teacher traditional expertise in teaching and learning is now added to by: emergent ICT

for teaching and learning, data management, delivery of standardized content and programs, and the capacity to individualize. School leaders are tasked with effective and efficient PD for an increasingly challenging profession. In each area, PD is a transformative factor.

For instance, in addition to growing digital 'literacy' in students (diSessa, 2000; Lankshear & Knobel, 2008), ICT literacies and skills need to be learned by teachers too. They can not teach what they do not know. Karen Seashore-Louis, a long-time advocate of professional learning communities, concurred that "Professional development is an inconvenient problem now… change won't happen without the professional development that isn't happening" (Louis, 2011). This inconvenience is only amplified by a rapid proliferation of new ICT and tools available. Though I will focus here on teacher PD, the challenge of PD is a systemic one and ICT PD for teachers can have relevance for other school professionals too – and even other professions. Reform efforts using new media, ranging from classroom learning to national data collection to school leadership, require local stakeholders to have the proficiency and tools to fill the new roles demanded of them. For instance, school leaders must be able to filter, represent meaning, and disseminate relevant information, from testing data that aligns, with school vision and goals for students learning. Are adult professionals within the school system prepared to use the large amount of data available?

"Data warehouses are virtually useless" without tools and training to use

them (Louis, 2011). Data collection at scale is only possible using digital scanning, processing power, and online communication tools that facilitate the collection. With them, educators collect more data than is possible for local practitioners to process in meaningful ways without powerful and simple to use tools. "Most technology efforts fail because there is no PD" (Richardson, Flora, & Bathon, 2011) despite twenty years of calling for more effective PD design around instructional technologies (Mumtaz, 2000).

School leaders also play a central role in realizing the transformative potential PD and ICT in classrooms (Osborne & Hennessy, 2003). Where teacher training and PD facilitate the transformation of classroom practices; it is important to recognize over twenty years of collected research that shows effective school leadership for learning has the potential to transform PD (Leithwood, Seashore-Louis, Anderson, & Wahlstrom, 2004; Leithwood, Seashore-Louis, Anderson, & Wahlstrom, 2010; Youngs & King, 2002). Specifically, it is in the organization of the context for learning that leaders can influence successful transformative practice (Byrk, Sebring, Allensworth, Luppescu, & Easton, 2010). In looking at successful trajectories of teacher PD, this study informs both teachers seeking PD and the leaders that design contexts for practice and PD experiences.

Finally, there are those that call for improved education from outside the profession – external reformers. I pose that these reform efforts operate on either

a deficit or surplus model of PD. A deficit model puts the blame on teachers for resisting change, requires that we ignore the largely positive intentions of many teachers, and assumes teachers are unaware of the need for 21st century skills and tools. These are significant assumptions. These reformers become frustrated when practitioners shrug off 'new' ideas or become tentative to reform efforts. Resistance seems to be an accepted explanation for the stuttered adoption of reforms. The natural outcome of a deficit model is to either force reform (with consequences, incentives, and/or mandates) or to simply abandon traditional classrooms as having lost the capacity for relevant practice.

On the other hand, a surplus model of PD starts with the assumption that teachers design for the classroom *daily*, have a natural disposition to try new things, and are simply waiting for stronger, or more practical, models of practice. This model frames teachers as generally capable professionals. I agree with Somekh (2008), that teachers are ready to adopt masterful, effective, innovative, strategies for learning. PD for these teachers involves an ongoing effort to provide models of practice they can use to inform practice amidst rapidly changing technology, pedagogies, and tools. In fact, I argue that some are even ready, or already are, designing new teaching practices on their own. Instead of asking how to convince, bypass or trick teachers into taking their PD, my central line of inquiry asks how we provide them with powerful models of practice based on successful teachers already recognized as expert practitioners. Starting any

exploration of PD with the productive trajectories of exemplary teachers already engaged in effective practices is paramount.

My study addresses this critical need to develop new forms of professional development by studying the practices and career stories of those teachers singled out for their expertise in innovative, technology-rich learning. Many US states have official committees that name teacher-of-the-year professionals who already excel in teaching 21st century skills to students and colleagues. Rather than looking to the research literature to determine what teachers ought to learn, my study goes directly to these award-winning teachers to examine how they already learn – and what resources are relevant in their practice. I interviewed 39 award-winning teachers from across the country to hear about the practices that made them successful, the learning experienced that transformed their teaching, and the career stories that led them to become innovative professionals. This dissertation tells the story of these teachers, and distills their experience into professional development lessons that can shape the next generation of technology-driven, innovative teaching practices.

Chapter 2:

> "If school improvement is to make a difference for children, it has to be in fundamental ways about improving teaching and learning. Improving instructional capacity has to be the central target of school improvement initiatives."
>
> Spillane & Louis (2005)

Literature Review

This study situates the stories of award-winning teachers in the research on professional development. Professional development remains central to any and all reform efforts, and critical to efforts that transmit expert practices from one group of professionals to another. Improvements in classroom practice ultimately rest with teachers and the design choices they make each day (Fullan, 1993; Spillane & Louis, 2002) and with the leaders that support their practice in part through providing and designing professional development (PD) resources (Leithwood & Jantzi, 2005; Youngs & King, 2002).

In order to interview teachers, I wanted to capture their perception of current PD resources, but emergent assets for their growth. This literature review directly informed the protocol for the study so that I would prompt stories concerning 1) Traditional PD resources, 2) Emergent informal PD resources, and 3) Digitally meditated learning facilitated by ICT resources.

I first review traditional models of PD currently established in the literature. This review includes findings and claims about PD in four areas: content, context, motivation, and beliefs. I expected that the many of these findings would be

confirmed by this study to some degree, or be further explained. Then I explore findings surrounding emergent 21st century skills, as potential alternatives for PD. This pulls in a robust body of work that is documenting learning resources especially among *student* learners – but I find no reason not to inquire as to their relevance among adult learners too. I expected that these would provide a more complete picture of PD both inside and outside of traditional learning designs for teachers. I also expected that these informal learning stories would often include digitally mediated resources as they have in the 21st century skill literature. So the literature also informs a list of potential digitally mediated PD resources for the participants to discuss in the interviews.

Finally, at the end of the literature review, I summarize literature exemplars of emergent technology studies. These inform the research approach I chose to use and the inclusion of prompts that ask about how teachers perceive and construct ICT in their practice. These include the social construction of technology (SCOT) framework, studies of early adopters and the tradition of exemplary models of teaching practice that have informed both educational leadership and curriculum and instruction.

Current Models of Professional Development

What do current training programs for teachers look like? Traditional PD is

clearly viewed as one of the conditions “necessary” for school improvement along with vision, school culture, resources, support, and monitoring teachers (Spillane & Louis, 2005). It is postulated that improvement efforts should be presented to teachers in small incremental changes that build to larger changes over time (Bandura, 1997; Ertmer, 2005; Schunk, 2000). Evaluation of the tools of evaluation (or PD) are powerful windows into both leadership practice and effective instructional leadership (R. Halverson & Clifford, 2006) toward improved instruction. As mentioned in the last chapter, transformed practice requires teachers to see other teachers, or models of practice, prior to a new trajectory of practice (Elmore, Peterson, & McCarthy, 1996). Without support and guidance over time, changes in practice are difficult to come by (Ball & Cohen, 1999).

Previous research has also examined the influence of information and communication technology (ICT) on professional development specifically. For example, Goodwyn, Adams, & Clarke (1997) used in-depth interviews with 20 teachers prior to transforming their classroom practices and identified three distinct teacher ‘groupings’; fearful, unresolved, and optimists. Pedretti et al (1999) found linkages between ICT and significant transformation of teaching and learning through a mixed methods study involving teacher observations (2) and student questionnaires. Moseley & Higgins (1999) provide an additional methodology for studying teacher transformation with ICT and offers 12 illustrations of effective use of ICT from the perspective of post-practice

transformation. A limitation of these studies is that they are based upon small sample sizes, however they draw upon qualitative methods and were intended to be descriptive in nature.

In Desimone's recent summary of effective PD (2011) she finds effective professional development follows these steps:

1) Teachers experience a PD program that typically involves some level of instruction to introduce a new concept, program, or tool.
2) Teachers' increase in knowledge and skills.
3) Teachers experience a change of attitudes and beliefs.
4) Teachers begin to use new knowledge, skills, attitudes, and beliefs in practice.
5) Instruction changes to boost student learning.

Argyris' theory of action/use (1997) problematizes the formalized delivery of PD and suggests that there may be instances of PD that occur *outside* of this model in authentic practice. Argyris' (1999) work, as this study will later ask, questions if the theory of PD matches actual PD practices. Desimone provides an excellent benchmark to match or compare PD processes, but I cannot assume that it a complete picture of PD today. Desimone's model is premised on an organizational theory where teachers are receptors of PD and facilitators are guides or providers of the PD. PD programs are arguably improved the closer they are situated in a socially organized context (Lave & Wenger, 1991), and the less dependant they are on prescribed, top-down models of delivery.

Therefore, effective PD is popularly accepted as the delivery of new knowledge *to* the teacher. The underlying presumption is that PD only occurs in formal learning settings where ideas are transmitted from the expert to the practitioner. Accordingly, according to this body of research, if the professional development intervention is not successful there are four main factors that should be examined prior to questioning top-down delivery. These each provide factors that inform the creation of prompts for this study and collectively current research in these four areas also imply the need to identify informal and digital resources for PD. In addition, the literature surrounding motivations and beliefs created a foundation for an entire theme of narratives in the findings. These factors include: the delivery of *content*, *context* of the intervention, participants' *motivations* and the *beliefs* of the teachers involved.

Content

"Well-Specified" PD *content* is defined as "well-defined systems, including academic tasks and instructional materials, descriptions of teaching, and student outcome measures," including, "activities and materials for teachers, descriptions of facilitator roles, and teacher outcome measures," (Borko, 2004). PD is defined by Borko as a package that requires fidelity of delivery in order for it to provide results. The goal of well-specified PD is to design materials that "maximize the likelihood that teachers and facilitators… will use them in the ways intended by the original design team." (pg 10). This model assumes that if content is delivered

uniformly, teachers will consistently respond to it.

In the same review, Borko concludes that this prevailing understanding of PD, “did not yield any professional development programs for which there is adequate evidence that they can be enacted with integrity by multiple facilitators or in multiple settings.” She progresses to focus on outlier PD models that produced measurable change with localized and individualized content. Though content may be relevant in some cases, evidence for standardized content of PD producing results is still in question.

Context

Additional research has explored the challenges and opportunities associated with professional development from the context of teacher PD. Considering the context of PD includes a range of complex features such as location, space, time allocation, politics, and community, there is a broader potential for research in this area. In the following section I use three perspectives to explore contextual factors influencing PD found in the literature, including 1) Job embedded best-practices, 2) Situated authentic learning and 3) Supportive influences of leadership.

Job-embedded learning (Sparks & Hirsh, 1997) claims potential best shown in the National Writing Project (NWP) that highlights teachers teaching teachers. The NWP provides a model of ‘best’ practice and attempts to make

their ‘profiles in practice’ available to teachers online and in workshops across the country. Later in the study, NWP teachers will tell more about their learning process. These cases are among over twelve thousand teacher leaders that have worked with over 100,000 teachers nationwide. NWP provides a local *context* for training for teachers without purposefully packaging ‘well-specified’ *content*.

Other research confirms activities and actions in which people learn are part of how and what they learn (Greeno, Collins, & Resnick, 1996). Learning embedded in the activities creates a natural learning context (Gee, 2004) Yet, “as a research community we have yet to build an empirical base to support the claim or to shed light on the mechanisms by which this relationship works.” and “It will take many different types of inquiries and a vast array of research tools to generate a rich source of knowledge...” Borko, 2004). Activity-based PD shows promise, however, and should be considered as a growing field of PD practice, if not yet substantiated in the literature. Teacher practice likely will change in a context of involvement, but involvement evades codified studies measuring the input of PD programming with the output of student learning due to individual differences in involvement in PD – a critique that could be equally leveled at any PD initiative.

Literature on social networks is also compelling for professional development (Daly, 2010) - if only for asking if different types of social networks

were perceived to be relevant to PD trajectories. Networks are seen as providing a context for access to information, professional dialogue, and larger collective thinking (Alag, 2008; Brown & Davis, 2004; K. Fisher, Fisher, & NetLibrary Inc., 1998) to solve common problems in practice and advance the profession. Participation in participatory networks is presented as especially social, civic, and professional asset (Jenkins, Purushotma, Weigel, Clinton, & Robinson, 2009). In this study, I limit my inquiry to the *perceived* relevance of such networks for PD, and take care to prompt narratives that cover a wide range of networks teachers may be a part of.

School leaders have an effect on teacher practices and resulting student learning also. “Teachers are more likely to pursue their collective and individual learning when there are supportive conditions in the school – particularly *effective leadership*” (Spillane & Louis, 2005). Leadership plays a key role and/or influence on PD for teachers (Youngs & King, 2002). The most effectual leaders support, provide resources for, and role-model transformative practices (Leithwood, et al, 2010), but they also must create *conditions* for effective practice that have influence far beyond their personal contact with teachers (Spillane, Halverson, & Diamond, 2004; Spillane & Louis, 2002, 2005). At best, effective leaders provide a context for alternative possibilities of practice, and ongoing organizational learning capacity (Argyris, 1999) that affects teacher practices.

Research in the context of PD suggests that exceptional teachers, will

have encountered *contexts* of PD that are job-embedded, activity-based, individualized and supported by effective leadership and tools. Unlike content, the context of learning has much more promising literature suggesting that exemplary practitioners will have experienced a generative context for learning. Of course this assumes that teachers are motivated to learn in the first place. Motivation for learning, or what I later consider a disposition toward practice, is therefore relevant for any study of effective professional development trajectories.

Motivation

If the content of PD and context of PD are well designed and supported, teacher learning and growth should follow. Teacher motivation plays a final string in the chord, however. Some start to look at the people themselves and design programming with incentives to lure teachers into improving practices. “Teachers likely need incentives, such as in-service or recertification credit... because the increased effort requires time and cognitive energy” (Glazer, Hannafin, & Song, 2005). If teachers need incentives, direct financial motivation should result in effective practices (Odden & Kelley, 1997), however this has shown only minimal effectiveness (Fryer, 2011). So where financial carrots do not work, another tack may be efforts to ‘gamify’ PD or create badges for teachers (YouPD, 2012) in playful ways.

At the same time, proponents of refined motivation for PD are also

informed by social influence. Teachers may adopt or reject new practices based on the social relevance of the practices (Lave & Wenger, 1991). Community is shown to be a source of support for teachers to sustain efforts toward new practices (Hausman & Goldring, 2001) This is especially important for ICT adoption (Carney, 1998) via 'collaborative reflection' both formally and informally. Studies of a Community of Practice (Wenger, 1998) for teachers (Louis, 1998) appear to also have a motivating effect for effective PD practices (Louis, 2006). For instance, The Collaborative Apprenticeship encourages teacher motivation in stages of introduction, developmental, proficiency, and mastery (Glazer, et al., 2005). For each stage teachers work in collaborative settings with other teachers based on their level of competence - expert teachers encourage novice teachers and as teachers grow in competence, their collaborative relationships change. This model is build on the belief that motivation exists, in part, within social relationships and interactions.

Both context and motivation efforts have found promising outcomes when developing PD in congruence with social realities. Social connections of teacher practice include both the "real world" of schools and "theory of use" motivations researchers bring to PD mandates for change. Inquiry into context then is informed by the social elements of culture, networks, and relationships between principal actors in a school setting. This is exemplified in the case of District #2 study in Chicago (Elmore & Burney, 1997) where tensions between prescribed

reform efforts were resolved locally and mediated by leadership beliefs about the reform agenda and how it was actually carried out by all involved.

Beliefs

After 'receiving' PD programming and content, the traditional model claims that teachers shift their beliefs. Other research suggests that teacher beliefs serve as a filter or lens through which participants evaluate whether or not program content is integrated into practice. For implementation, teacher beliefs outweigh any other factors in adoption of new practices (Veen, 1993). Educational change is conditional based on "what teachers do and think – it's as simple and as complex as that" (Fullan, 2007). Teacher beliefs have been shown as relevant factors for understanding technology rich PD (Dwyer, 1991) for some time. If the technology matches existing pedagogical interests, teachers use it with minimal resistance. So what are those beliefs?

Despite the clear importance of teacher beliefs for PD, they remain a decidedly "messy construct" (Pajares, 1992) around which the field struggles. PD is defined as, "A vast range of activities and interactions that can increase [teachers'] knowledge and skills, improve their teaching practice, and contribute to their personal, social, and emotional growth" (Desimone, 2011). More narrowly some choose to focus on an "instructional unit" (Cohen & Ball, 1998) of the teacher, the student, and materials used for learning.

Returning again to District #2 in New York (Elmore & Burney, 1997), the

idea that singular, standardized, reform efforts are even possible requires that we assume all school leaders and teachers have identical beliefs. Uniform reform efforts simply may not be possible. What models of *non-standardized* teaching and learning exist that may also inform PD design? And more specifically, how do these fit in light of the current ubiquitous emphasis on the 21st century skills movement? In addition to a review of current or mainstream PD, a full understanding of emergent influences on teacher trajectories of PD must also consider the claims of 21st century skill advocates that there are 'emergent' models of learning that are powerful and enabled by ICT.

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Emergent 21st Century Skills as a Model for Professional Development

A progressive call for 21st century skills presents an alternative agenda for professional development in education today. 21st century skills is still an overly general term that includes: "Core subjects and interdisciplinary… themes; Life and career skills; Learning and innovation skills; and Information, Media, and technology skills." (Trilling & Fadel, 2009). This definition is still in process. Here I review the work done defining and expanding on this definition. I do so because in addition to PD that is currently available or formed for school leaders, there is growing evidence many digitally mediated resources are emerging for PD that may not yet be recognized as such in the literature for teacher PD.

For the last ten years scholars have been documenting and sorting a new set of digitally mediated practices. Reading and math skills alone don't embrace essential '21st century skills' (Trilling & Fadel, 2009) or literacies (Lankshear & Knobel, 2008; NewMediaConsortium, 2005); and may even be in tension with skills needed for the next generation to be 'educated' because intense focus on NCLB goals may reduce needed time for 21st century skills. Attempts to create common language for media education (Jenkins, et al., 2009), or standards of learning (ISTE, 2010) call into question the basic premise of measuring schools based on reading and math capacity - exasperated by entrenched notions of reading and math using measurement tools accompanied by efficiencies that are still emerging in the new paradigms. Namely, the digital technologies of today facilitate new ways to access, communicate, and leverage information that aren't captured entirely by traditional goals of reading and arithmetic.

21st century skills and the use of new media are not an anomaly among a small fringe population as they perhaps once were, but nearing ubiquity among youth (Rideout, Foehr, & Roberts, 2010). Digital media now joins text, audio, and film as core media for entertainment and informal learning. The processing capacity of digital media expands computer's abilities to build entire worlds, stories, simulations, or semiotic systems (Gee, 2007) actually capable of situated learning (Lave & Wenger, 1991) and communities of learning (Steinkuehler & Williams, 2006) that frame not only what is learned, but how cognition happens

(Hutchins, 1995a). If learning itself is adjusting to new digitally mediated cognition, it stands to reason that teacher PD would be affected also.

Specifically in the context of education, Instructional Technology is "the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning" (Seels & Richey, 1994). The Partnership for 21st Century Skills (P21) more broadly defines Information and Communication Technology (ICT) as, "any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning," (Trilling & Fadel, 2009). Because this field is still refining a clear definition, Figure 1 provides an overview of what constitutes 21st century skills for a collection of authors:

FIGURE 1: 21st Century Skills List Comparison

	New London Group	diSessa	New Media Consortium	ISTE	Lankshear & Knobel	MacArthur/ Jenkins	P21/Trilling & Fadel (reduced categories)	Other potential skills
	1996	2000	2005	2007	2008	2009	2009	
	SUM	CES	SUM	SUM	SUM	SUM	SUM	
Attributes Students will...	Immerse in work	Show ownership of learning	Display a transformed learning	Show Creativity & innovation	Learn independently	Play in work	Apply imagination & invention	
						Performance	Show initiative & self-direction	
		Play in work				Multi-tasking		
Abilities Students can...	Read and understand digital and non-digital formats		Read and understand digital and non-digital formats	Read and understand digital and non-digital formats	Read and understand digital and non-digital formats	Appropriate	Read and understand digital and non-digital formats	
						Critically process simulation		
					Show information skills - 'pull'	Distribute cognition		
	Critically frame	Personalize work	Learn a new grammar	Critically think & solve problems / Use effective research skills	Evaluate information / Show media skills- 'push'	Judge	Critically think & solve problems	
	Communicate multimodally		Communicate multimodally	Communicate multimodally	Communicate multimodally		Communicate multimodally	
Social Graces Student display...			Interactive communication	Communicate with others effectively		Network	Interact in social and cultural diversity	
		Mentor other students		Collaborate with others effectively		Negotiate	Interact flexibly & adaptably	
Unique items Students also...		Learn at different paces	Use media to evoke emotional responses	Express digital citizenship	Express moral and social literacy	Collective intelligence	Act productively & accountably	Hanging, messing, & geeking
		Display generativity of interests		Make decisions			Show leadership & responsibility	'Cheating', 'losing', & 'pirating'

For instance, The New London Group (1996) clarified that students need to read across digital *and* non-digital contexts. For this group, 'reading' varies depending on whether it is a text, a webpage, a video tutorial, an image, a screenplay, a database, or a chat stream. The medium itself must be mastered in a way that is not captured in current NCLB testing models of 'reading scores', therefore to pass AYP, schools may forgo relevant and broad 'reading' instruction to teach to the test. Where AYP shows how many students can read a paragraph and normative research can identify 'what works' to teach this skill; it still fails to show if a student can weigh the reliability of online information, follow streaming chat logs, or identify junk mail efficiently. Traditional models of 'reading' skill are not the same as 21st century 'reading' skills and nowhere near as easily measured.

These scholars argue that in the same way digital technology has enabled massive data collection and online clearinghouse solutions, it has also created new workplace skills and learning needs. Many have assembled lists of '21st century skills', in summative reviews of education research. Across these reviews, there is some consistency and when laid out side-by-side, they present a clearer picture that 21st century skills include: 1) attributes professionals have, 2) what they can do, 3) social graces they display, and 4) skills that are unique to the use of ICT or manifest literacies with digital resources.

This study includes prompts to see if these skills have taken a positive role in the learning trajectories of exemplary teachers as they have outside of

education and among students. The same broad ICT technology that can gather millions of data points on students, can also share lesson plans, build networks, create simulated experiences, and come with a new grammar (Gee, 2007) that separates the digital 'haves' from 'have not's'. 21st century skill literature shows promise not only for students, but for teachers and school leaders.

Collectively, these reviews of the literature account for relevant skills in the context of home and the workplace, The central claim of the research is that these are skills needed for participation in a changing digitally mediated world. These skills don't replace basic reading and math skills, but call for expertise in higher order thinking, communication, and production. Codified *Schooling,* and testing, may be contrary to what is needed for relevant *learning* (Collins & Halverson, 2009). The question is not what ought to be measured, but what is relevant and necessary. Progressive codification, though voluntary, is called out as regressive (Gatto, 2009), anti-democratic (Apple & Beane, 2007), and even irrelevant (Gee, 2010) for those backing a call for transformative models of teaching and learning.

My own use of 'ICT' and '21st century skills' is thus framed by the proliferation of personal technologies that give users access to information and communication instantly and intimately at a decreasing cost. IT conversations are also no longer only about institutional facility, but need to be informed by the conversations started in the mid 2000's around mobile learning, professional-amateur communities, and online networks and communities. Protocol questions

below then include prompts that capture a full range of tools and uses accordingly.

'21st century' versions of skills often imply the use of ICT tools that are embedded with 'distributed' cognition (Hutchins, 1995c). From this view, a community of practice includes the designer, the user, and the tool itself – learning, or PD, is both physical and cognitive. ICT tools present new modes of communication, production, and consumption. As the tools for meaning making change over time, so do the relevant learning practices surrounding them. These learning practices may be separate from their digital contexts, but remain relevant because of the larger societies use of those practices.

Scholars suggest both that there *are* 21st century skills and tools (Gee, 2007; Ito, et al., 2008; Jenkins, et al., 2009; Trilling & Fadel, 2009) and they can be learned in practical use both in and out of the classroom setting (Mathews, 2010; Squire & Jan, 2007; Steinkuehler & Duncan, 2008). With growing research reinforcing the potency and importance of these skills, field research supports the opposite of codification of teaching practice around text reading and math skills, but instead calls for a more individualized and constructivist view of education (Squire & Jan, 2007).

Because research in this new field is highly emergent and strongly influenced by theorizing, connecting theory to practice, and practice to professional development strategies is vital. Halverson and Halverson (2011) make a useful distinction between Type 1 research that explores emergent

phenomena and adds to scientific knowledge and Type 2 research that asks what can be designed to facilitate learning practically. These work in concert to build new knowledge. Based upon this orientation to research, the goal of this study focuses on both the outcome of Type 1 identification of phenomena (above) and inquiry into practices 'emergent' from new innovation (below). In regards to PD, this "provides important data to refine intervention design, while at the same time allowing [teachers] to construct powerful cognitive and behaviorist models of how [teachers] encounter new tools" (pg 17).

Combining these two objectives is potent because school leaders and teachers are being pushed not only to teach traditional reading and math skills, but also to prepare students for jobs that don't yet exist with skills that are not easily measured or codified. Old models of PD are no longer effective. 21st century skills, literacies and competencies largely require experimentation and design (Ito, et al., 2008), where national standards allow minimal room for experimentation with any margin of error (Collins & Halverson, 2009). We have models of how PD *should* unfold, how that may be deficient, but we need to look for a moment at how PD *is* unfolding in order to understand trajectories of learning toward ICT integration.

Emergent PD models and delivery occur both within and are influenced outside of the workplace. Effectively this includes a teacher's entire life and their ensuing beliefs. Research that bypasses the primacy of formal PD, to look beyond the classroom, show that what appears to be 'messy' may just be outside

of the focus of PD research. In addition to establish models of PD, I review outlier studies below that suggest that 21st century skills may also have 21st century learning models that are increasingly relevant to teacher trajectories of PD.

For instance, Becker & Riel's (2000) study of 4083 constructivist teachers found that teachers who participate in professional interactions beyond their school are positively correlated with increased constructivist teaching philosophy and practice. Though this study is not about constructivism, *per se*, the study does provide grounds to include prompts concerning the relevance of such interactions to expert teachers to see if these interactions are useful beyond a specific pedagogical approach. Interestingly this study also found a trend that implied more integrated computer use as tools for communication, production, and collaboration. They do not establish causation or condition for these interactions and call for more research to understand this connection more clearly, however PD models that affirm larger learning networks show promise for PD and ICT practices.

External networks of teachers have an effect on PD that has been long acknowledged (Talbert & McLaughlin, 1994). My inquiry into PD beyond the school is informed by other work suggesting what these may look like; especially emergent evidence of *digital* networks for student learning (Gee, 2007; Jenkins, et al., 2009; Leander & Lovvorn, 2006; Squire & Dikkers, 2012; Steinkuehler, 2006) are also likely to be at play for *adult* learning. This study builds on Becker and Riel's work to ask, "Do you have relevant PD outside of formal PD within

your school," and if they do, then contribute a clearer picture of what shape these interactions take for exemplary teachers. Using evidence for how these look among youth informs questions later in this study to see if they play a role in teacher PD also.

In addition to seeing emergent learning among youth, adult PD is potentially influenced by the 'VCR Remote' effect. When VCRs first came out, they added a second remote control and increased button options that notoriously confused older generations – who then turned to the youthful minds in their homes to figure out how to set timed recordings, use 'counters', or even get the clock to read the correct time. In the same way that I taught my father how to use the 'new-fandangled device', student input may also be a valuable resource for teacher PD using ICT. One interesting PD effort leveraged the resource of willing youth to train teachers Hruskocy et al (2000). The study collected 'reflection papers' from teachers after sending *students* to PD and allowing them to share what they learned with their teachers. Students as a source of PD are also potentially less intimidating for adult learners. Students were able to help and encourage teachers to engage with new technology and try new things with exuberance, agency, and remarkable proficiency.

Tools themselves have embodied thinking that is part of the situated context in which teachers find themselves (R. Halverson & Smith, 2009; Hutchins, 1995b). More applications and digitally mediated delivery of PD are becoming available online. Full PD resources are available online on sites like

TeacherTube.com, Thinkfinity.org, Connexions (at cnx.org), Teachersnetwork.org, and the newly posted TED Lessons (at education.ted.com) – providing lesson ideas, lesson videos, mentorship, forum conversations, and other resources for teachers to integrate new ideas.

Specifically, a closer look at the link between ICT and teacher training estimates that about 30 percent of the cost of deploying educational software in schools is taken up by teacher training (Perez, 2009). When attended to as part of a new initiative, clear success stories emerge. For instance Chris Dede, principal investigator for the River City Project, reports,

> "We switched teacher training over to Eluminate [a webinar-based delivery system] to cut costs [over in-person training]. Teacher responses were quite high. No one complained." (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009)

Teacher training for serious games is currently provided in a number of ways, from exclusively online resources (e.g., Time Engineers), to a mixture of online resources and in-person training (see *Making History*, Immune Attack, *River City*), to mostly in-person training (*DimenxianM*).

When interaction between students and teachers (or the ability to ask questions) remains intact, digital mediation has been shown to have minimal affect on lower order retention. Modern webinars or 'how-to' videos are even thought to be nearly as effective as in-person training (Mayo, 2010) as long as learners can still ask for clarification in some way. Digital tools can facilitate

human interactions when the technology is understood and used smoothly.

Collectively, traditional PD resources and emergent PD resources build a complete picture of professional trajectories of practice. For this study, I use both bodies of literature to justify inquiry into PD that includes traditional PD, non-traditional PD resources, the use of technology, and PD that emerges from situated experiences. Because the nature of ICT is changing rapidly, the materials above provide a starting point for research, but I also wanted to make sure to have an interview protocol that would prompt narratives about new practices and new PD resources that may not yet be captured in past research. Emergent PD then can be informed also by past work showing how the users construct the technology in practice.

Exemplars for Inquiry into Emergent Technology Use

Understanding emergent practices in teaching and in the use of technology has strong foundational work already in place. The following research provided a model for how to approach both early adopting and expert practicing teachers as I do; and this study extends the application of Pinch and Bijker's (1984) Social Construction of Technology (SCOT) inquiry considerations for teachers as a user group.

Early Adopters

Every few years researchers seek to find innovators, gather their stories

and explore the work they are doing that shows what 'great practice' may look like; as a way to inform the field and help give nuance to other threads of research (Apple & Beane, 2007; Cole, 2006; Garner, 2002; Lightfoot, 1983). Maverick teachers, or early adopters (Songer, Lee, & McDonald, 2003), have been valuable resources for understanding emergent practices.

Though early adopters are different from mainstream practitioners (Becker, 2000), they also provide glimpses of future practices that can become standard PD at scale. Early adopters may or may not define exemplary practice, but they can show what works for them and practices they have abandoned. This process is itself a form of professional development.

These examples of PD show that solutions *are* available in specific cases, especially when teachers have an interest or onus to make new practices work. A growing number of these local cases are building a body of literature that suggests there are innovations in training that complement new ICT (Borko, 2004; Clark, 2008; Glazer, et al., 2005; Gomez, Sherin, Griesdorn, & Finn, 2008; Gosen, 2010; Guhlin, 1996; Harwood, 2001; Veen, 1993). I see this study as an additional complement to understanding how innovative practice and tools are connected through PD.

Future studies of 21st century teaching should start with a clear understanding of what is *already* working for teachers who have become early adopters of ICT for themselves and their classrooms. Based upon *both* the established body of teacher PD and research practices associated with digital

media and learning, emergent practices and themes are effectively accessed by qualitative observation and interview methods of early adopters and understood in terms of both traditional and emergent models of PD. Findings report illustrative cases outlining what has worked for exceptional practitioners that have successfully transformed practices based on their PD trajectory of learning.

Both basic skills and 21st century skills are regarded as important, the development of effective PD for both will determine the effectiveness of reform efforts. Though there are both traditional and emergent delivery models that appear to be promising, it is still not clear what kind of PD, or natural trajectories of learning, may leverage new practices or ICT integration. Initially the field needs to be informed by asking exemplary teachers, “How did you get where you are? What PD was relevant in your trajectory of learning?” And, while these questions are considered, be aware that teachers may have existing beliefs and a socially constructed understanding of ICT that result in new PD assets for relevant practices.

Exemplary Practitioners

Early adopters and exemplary practitioners are not quite the same and provide slightly different insights for the design of this study. Where early adopter studies show the importance of noting new practice, exemplary studies justify limiting the sample set to experts to sort out effective innovation strategies from the rest. Limited samples lead to expanded samples that collectively inform

nuanced theories of practice.

For example, earlier studies of teachers using desktop based computers found that teacher's perceptions were able to link both personal and psychological factors that affected resistance and acceptance of new development trajectories (Mumtaz, 2000). Specifically in the Bank Street study, (Hadley & Sheingold, 1993; Sheingold & Hadley, 1990) used a qualitative approach using surveys of perceptions and attitudes. Much like this study, they sought a specific sample of exemplary practitioners that had students using computers in a variety of ways in order to provide a common portrait of computer use for other teachers.

One critique of this study (Becker, 2000), noted the use of exemplary teachers is limited to only findings regarding exemplary teachers and their existence. Becker expanded the findings of the Bank Street study to compare computer-using teachers to other teachers with a survey of 516 teachers. He found that exemplary teachers, though meeting success with new ICT in the classroom, had a different set of beliefs, practices, learning habits, and attitudes toward technology, or what I call a 'trajectory' of professional development.

Only a few years following, Webb and Cox (2004) used both studies, in part, to inform a full review of the research for a seminal "framework of pedagogical practices" for ICT integration. They exemplify a refinement *process* within a field to advance understanding of practice starting with experts and moving toward larger application. Each study progressively built on the prior to

progress from 1) a smaller study of exemplary trajectories of development to, 2) a broader comparison to mainstream practice that, 3) informed a theoretical framework for practice. I see this study as one of the first order, seeking to identify exemplary practice among a smaller set of exemplary practitioners.

These three studies collectively, provided a foundation for methods that capture teachers' beliefs, pedagogical frameworks, and use of ICT in the classroom. The technology and tools in use however have changed in significant ways since 1990 (see lit review of 21st century skills on page 17). Where the frameworks and findings may have changed along with the facility of the new ICT, the collaborative research initiative and methods remain practical. This study seeks to initialize a similar method of inquiry for the field, as Hadley and Sheingold did, by seeking out exemplary practitioners and using qualitative inquiry methods to capture a common portrait of ICT use today.

The scope of these initial findings will also be limited. I expect future research to take the steps of Becker and others toward a common understanding of teacher professional development trajectories of learning that can inform the design of training and development programming. Exemplary teacher research begins a larger conversation intended to fill a gap in the existing literature or to update frameworks of practice based on current evolutions. It also provides a foundation for my research trajectory involving a potential expansion of this study comparing these findings to mainstream teacher samples and informing future consideration of teacher training and professional development frameworks.

A final consideration, informed by the field, is that both early adopters and expert practitioners may yet be able to represent or voice their practices with a common language. To better capture perception and understanding of emergent practices, I chose to include prompts for narratives about their perception of technology informed by the SCOT approach.

Social Construction of Technology

Historically, user's beliefs and their use of new technology affects future design (Pinch & Bijker, 1984), and how it will change practice. To contribute to a more discrete understanding of how learners (even adults) develop, capturing beliefs and practices can provide insights on future design and the future of practices. For instance, in order to better design mobile games for learning, and to contribute to the growing body of literature on youth media (Gee & Hayes, 2010; Ito, et al., 2008; Steinkuehler & Williams, 2006), Kurt Squire and myself chose to examine practices with mobile media in daily lives, inside and outside of school, (Squire & Dikkers, 2012). By understanding how devices were *naturally* used for learning, future learning designs could complement a social construction of technology already in place (Bijker, Hughes, & Pinch, 1987).

SCOT theory presents an interesting approach to informing research design in relation to technology. The primary steps are to clearly understand how the *user* constructs the technology, what beliefs are in place, and build understanding based on the user, not the predispositions of the researcher. This

approach simply requires a conversation with those that are actively using new technologies to better understand the direction and application they will take. The goal of educational leadership for both teacher training and PD is not to force teacher transformation, drop-in technology, or bemoan resistance to change. The goal is to clearly understand the beliefs, current social construction, and use of technology and then to apply these findings to the design of PD programs.

Summary

If we seek to advance any reform agenda, the need for relevant teacher professional development is seated squarely in the middle of the discussion. Teacher practice constitutes the moving parts of systemic changes in the school system, and most teachers practice in a way that they perceive as best serving student learning. As schools need to change, teachers must embrace new practices.

Much of the current research on adult learning assumes that a top-down delivery model constitutes a valid starting point for exploring what works and what doesn't in teacher growth over time. Instead of directing our attention to creating more engaging, motivating, and relevant PD, (as we ask teachers to do for students), we to often take the easier path of claiming teacher 'resistance' to PD and even waste efforts studying what can easily be framed as the symptoms, not the cause, of failed PD efforts. Current research in 21st century skills suggests that new digital resources can facilitate entirely new skills;

competencies and ways to think about learning can also inform our understanding of what constitutes ideal learning conditions. Each resource identified above (traditional, emergent, and digitally mediated) is included in the protocol to establish grounds to identify each among award winning teachers and capture some degree of their relevance to the participants.

I start with a surplus model and ask expert practitioners if we are right to assume that teachers are entering the profession with relevant skills and dispositions toward their PD. Narrative accounts provide an established lens to identify actual trajectories of PD in expert practice and compare these to Desimone's "Primer of Effective Professional Development" (2011). Next, the above literature provides a list of PD resources (traditional, informal, and digitally mediated) that informed the creation of the interview protocol. For each prompt, teachers helped shape a better understanding of role and relevance of each PD resource. I also asked participants to share what technology they were using and both how and why they came to use it.

Finally, building from past studies of early adopters, exemplary practitioners, and technology users, I have chosen to allow for a more open protocol that allows teachers to tell their narratives about PD. This allows the study to form insights into practice and PD that participants may not otherwise illustrate *because* the practices are new to them too. This is more fully expressed in the following chapter detailing the methods of the study.

Chapter 3:

> "We should measure common features that research shows are related to outcomes we care about"
>
> - Desimone (2011)

Methods

The 21st Century teaching project is an exemplary teacher study that includes 39 teachers recognized for innovative ICT practices and/or awarded for excellent teaching in general. Interviews were designed to capture narrative accounts of their professional growth over time and the traditional, informal, and digitally mediated resources that were perceived as relevant contributors to their PD. Data collection was based on the life-narrative approach of Dan McAdams (2011) that starts with a smaller sample of early adopters (phase 1) and refines the protocol for a larger sample of exemplary practitioners (phase 2) in order to both "discover" potentially emergent themes and "justify" their reality within a larger sample set. Data analysis was based on five stages of PD that highlight beginnings, dispositions and transformations, experiences, refinements and convergences. Five thematic chapters highlight findings for the first three of these stages; showing exemplary teacher 'beginnings', 'dispositions and transformations', and the third theme divided into 'experiences of PD', 'experiences with technology', and 'experiences with leadership'.

Exemplary teacher studies have a strong tradition in education and developmental psychology. As a profession, teachers “generally welcome the opportunity to discuss ideas and materials related to their work, and conversations in professional development settings are easily fostered” (Borko, 2004). Even so, it is vitally important to remember their beliefs do affect practices (Calderhead, 1996; Kagan, 1992; Pajares, 1992) and beliefs are informed by experiences (Ertmer, 2005). In order to capture beliefs that lead to change, this study follows a qualitative interview process to map experiences along with relevant PD that lead to the integration of ICT – or ‘trajectories of practice’.

A trajectory of practice is a paradigm requiring a “complex, holistic picture, formed with words, reporting detailed views of informants” (Creswell, 1994). This study requires a qualitative approach that allows for thematic organization of a qualitative paradigm. I agree, “Such records of practice enable teachers to examine one another’s instructional strategies and student learning, and to discuss ideas for improvement” (Borko, 2004). This chapter provides an overview for the methods used to collect and analyze data documenting and describing the trajectories of practice among exemplary teachers and their perception of relevant PD.

Methodological Approach

The design of this study is rooted in previously designed and implemented

case study research using subjects who are identified as exemplary. For example, the Bank Street study (Hadley & Sheingold, 1993) draws upon a sample of 'accomplished' or exemplary teachers nationwide showing:

- Teacher motivation and commitment to student learning,
- Administrative and system support experienced, and
- Access to sufficient quantities of technology.

Teacher's beliefs about what fosters professional development, what support and systems have helped them, and what technology is relevant to their learning provide a foundation for conversation about how and what PD facilitates 21st century teaching and skill use.

In addition, Ertmer's (2005) study of teacher pedagogical and technology beliefs included three types of experiences that were shown to have "promise for promoting change in teacher beliefs about teaching and learning…"

- Personal experiences
- Vicarious experiences
- Social-cultural experiences

Methods of inquiry needed to allow for teachers to tell full stories without time limits or restraint. Each teacher narrative could provide new insights that would inform the study. "Research using the individual teacher as the unit of analysis also [validates] that meaningful learning is a slow and uncertain process for teachers, just as it is for students." (Borko, 2004). Learning is potentially different

for each teacher and even each narrative presented, yet I believe across cases, tends and patterns can be identified.

As a result, I chose an interview process instead of a survey process (as used in the Bank Street study mentioned above) in order to be able to gather full narratives of trajectories. Initially, this seemed to fit with a single case-study (Yin, 1984) or cross-case analysis (Stake, 2006) method, however my goals were not to explain the "unique vitality" of each case, but rather, like Ertmer, to gather types or themes that emerged from the participants stories. The method needed to allow for "Detailed insights into the challenges and success of teachers experience with any new curriculum or reform" (Desimone, 2011).

Life-Narrative Analysis

My research design included a two-phase study model that uses interviews to capture situated perspectives or trajectory narratives of successful professional development. Analysis is mirrored after Dan McAdams' (2011) life-narrative approach for thematic organization and testing of the data. This method produced a similar study (McAdams & Logan, 2006) to this one - on the beliefs and trajectories of creative academics.

McAdams' narrative analysis uses a modified grounded theory in the first phase, or what McAdams calls the *context of discovery.* In this context, or what I will also refer to as phase 1, the goal is to conduct interviews that allow enough freedom for the participant to reveal emergent practices that may not have been

included in the protocol or previous literature. Probing questions and open-ended topics recognize that the expert will add themes, topics, and insights that can provide valuable refinements to the interview protocol. Prior to conducting a large study with unnecessarily slanted questions, the context of discovery is especially useful when asking about narratives in relation to new contexts, tools, and experiences. In the findings chapters, I will single out a particular illustrative narrative.

When asking about traditional models of PD I could largely draw from the literature base. Given the emergent and rapidly changing ICT, I did not necessarily have research-based evidence to test. Instead, I drew upon 'working theories' of 21st century skills from the research in order to design the interview protocol to address non-traditional and digitally mediated PD. During a pilot study, I interviewed (n=8) exemplary teachers in longer (avg. 1 hr 24 min) sessions in order to explore open-ended narratives of "patterns, themes, images, and qualitative characterizations" (McAdams, pg 16). After organizing themes from the interviews, I was able to form theories of relevant factors for PD and construct protocol to test them.

Insights from the context of discovery were then "tested as hypothesis" in what McAdams calls the *context of justification*. The purpose of justification in a life-narrative analysis is to use the refinements made from discovery to get a sense of whether or not those identified themes and emergent patterns bear out in a larger sample. To allow for larger samples this can be a simple tally of

whether or not narratives concurred with or diverged from discovered patterns in phase 1. Justification helps to eliminate isolated narratives and further identifies which expert practices are unique, which are common, and which may have been missed in the smaller sample.

During phase two, I invited teachers that were identified as exemplary practitioners through a national level awarding process to add to the full data set (n=39). Data sorted on phase one findings were tallied based on their confirmation or rejection of phase one themes. Relevant PD narratives were singled out and reviewed across cases for further refinement of themes that described professional development beginnings, dispostions and transformations, experiences of PD, experiences of technology, and experiences of school leadership. What follows is a representative sampling of exemplary practitioners and a systematic examination of how they narrate their professional development trajectories.

Role of the Researcher

This is a dissertation study and my role was to organize, interview, and conduct analysis on the data in this study. My background as both a teacher and school principal provided a natural discourse familiarity that I believe was an asset in the interview process. In addition, past work with the Games + Learning + Society research group at the University of Wisconsin – Madison provided background for a review of 21st century skill literature and recognition of practices

that are relevant to this field.

Sample Selection: Phase 1: Context of Discovery

Past early adopter studies define and find practitioners that are using or practicing in ways that are novel or new. These participants were selected because they are the source of an idea or recognized as one of the first to practice in a new way. All the participants were presenters at the 2010 Games, Learning, & Society Conference held in Madison, Wisconsin, where candidates outlined their own practice and use of technology to improve learning and could be approached in person to be part of this study. All eight of the candidates approached agreed to an interview for this study.

Participants were presenting because they were publically known as the first, or earlier, users of these technologies in the classroom including the use of: 'Broken tech', Second Life, World of Warcraft, Strategy Games, Mobile/Augmented Reality tools, and Studio-based classrooms (See Appendix 1 - Participant Bios). What and how they *currently* practice is not detailed in this study however, because my interest is in how they *arrived* at these practices.

In order to have findings with the potential to inform large scale PD reform, teachers needed to be working or have been recognized for work in a 'typical' classroom setting while they were experiencing PD toward innovative practice. I filtered out teachers that were too far from a mainstream teaching experience defined by:

- Class size - 20-40 students per instructional unit.
- Class time - Traditional or discrete class 'periods' of 50-70 minutes.
- Reporting requirements – Required to turn in grades for instructional time.
- Confirmatory Interviews

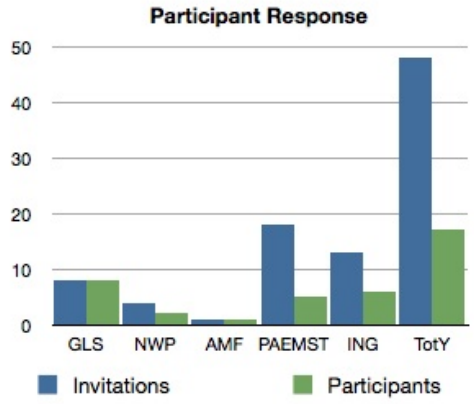
Confirmatory interviews were briefly conducted by phone with the teacher's principal and one colleague that could confirm that the teacher's practice was innovative and perceived as such at the local setting. I also selected teachers practicing independent of outside unique resources like grants, university research, or transitional school reforms. Outside assets are not common to most teachers and would provide atypical results for PD. Finally these teachers were already publicly recognized as first generation innovators. Two cases were eliminated from the study due to innovative practices being introduced by outside personnel. In all other cases, the practices recognized were carried out within the selection criteria.

Sample Selection: Phase 2: Context of Justification

For the second phase of the study, I invited an expanded national sample of award-winning innovating teachers (Appendix 2) with a preliminary e-mail, and a follow up e-mail for recruitment (Appendix 3). I invited 92 teachers total (phase 1 and 2) and received a 42% response rate (n=39) despite 12 candidates no longer serving in the profession and three teachers that were excluded based on the above criteria. These teachers constituted a sampling across award programs for

both innovative and expert practice.

FIGURE 1: Total Participant Response Rate



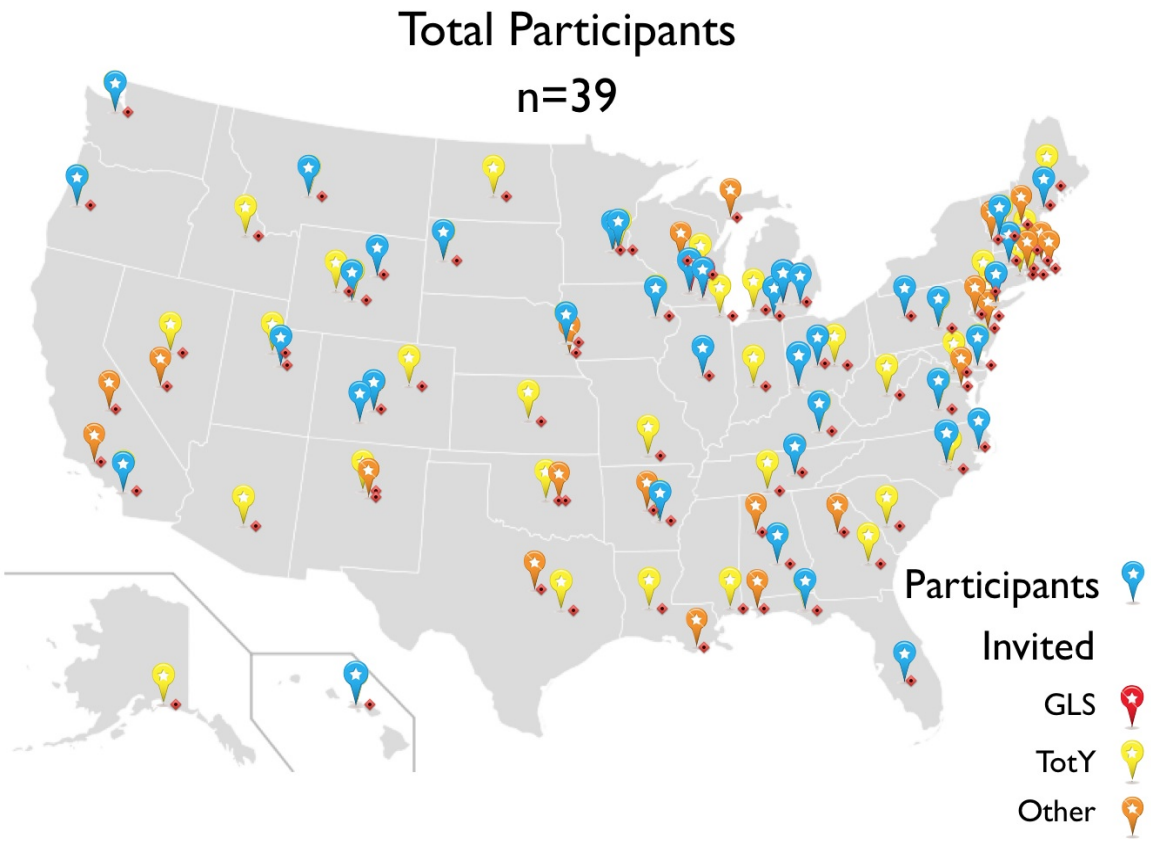
Recognition/ Award	Type	Invitations	Participants
GLS	Digital Media	8	8
NWP	Writing	4	2
AMF	Science	1	1
PAEMST	STEM	18	5
ING	Innovation	13	6
TotY	Expertise	48	17
		92	39

42% Response Rate

Phase two (n=31) participants represented one of the following national awards/programs (detailed in Appendix 2) each with a nomination and selection process that proposes to find early adopting or expert practitioners:

- Teacher of the Year (TotY n=18)
- Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST n=4)
- National Writing Project Profiles in Practice (NWP n=2)
- Alan Shepard Technology in Education Award (AMF n=1)
- ING Unsung Heroes Award (ING n=6)

FIGURE 3: Invited and Participant Geographical Distribution



These awards were selected for their prestige and variety of award considerations (see “type” column on Figure 2 table). Each program has a nomination/application and selection process that confirms both practice worthy of recognition (exemplary practice) and public acknowledgement that these practices are ones that stand out as current models of practice. Using their selection process as a starting point, I need not rely on my own network or definition of exemplary. Whether or not their practice is, in fact, exemplary, these are the teachers the community of practice (and arguably the teaching profession itself) has defined as such and therefore warrant selection in a study of

exemplary practitioners.

Data collection procedures

Participation was voluntary and included no incentives. The only benefit to balance the time taken was the opportunity to tell their stories. Participants were invited via e-mail and interviews were conducted over the phone at the teacher's convenience. Preliminary teachers agreed to interviews with one colleague and one administrator that quickly confirmed that each teacher was locally recognized as an innovative practitioner also. All teachers signed and verbally consented to be recorded and have quotes used as part of this and future studies. All teachers signed releases for use of their names in publications, as initially the protocol was more limited to the phase one participants. However I later chose to leave full names out of the analysis to highlight the findings as part of a larger sampling. Biographical sketches and profiles are still part of the appendices, as the public credibility of the teachers serves to empower the unique and compelling qualities of the data set.

Phase one interviews were conducted in March of 2011 and phase two interviews were conducted between September and November of 2011. Interview protocols can be found in Appendix 4 and 5. Audio recordings and timed notes were captured using a LiveScribe pen and notepad. I used transcription software Transana[1]. Signed participant consent and use of their name was confirmed

[1] Transana is developed and maintained by David K. Woods at the Wisconsin Center for

audibly at the beginning of the interview. After each interview, the recordings and transcriptions were stored in an independent hard-drive. The transcriptions were sent to each participant for review and correction. All content that the participant wanted removed or corrected was edited in order to further validate that the data collected was truly representative of the teacher's narrative. Four teachers sent revisions to their transcripts and confirmed the use of their name with references. Teachers were also invited to e-mail further narratives of PD if they came to mind after the interview time. These were added to the end of the transcriptions in two cases.

Phase 1: Discovery Analysis

Given the novelty of the topic, my intent was to copy the analysis process as closely as possible to an established process used in life-narrative analysis (McAdams, 2011). McAdams uses this methodology as a "highly generative" process that can result in the "discovery of a new…idea". I began by reading the discovery transcripts through twice. I sought to roughly identify themes or recurring narrative accounts toward a divergence of stories. McAdams notes that this is based on a grounded theory (Glaser & Strauss, 1967; Strauss & Corbin, 1990) approach; in that it seeks new frameworks in the data – yet McAdams concedes that the field of existing research informs what to look for and the kinds of themes that are part of the larger conversation in the field. I began the analysis, using McAdams process, by "reading through all of the interview

transcripts, taking notes and developing ideas as I moved from one interview to the next" (pg 19). These led to bottom up abstractions concerning trajectories of practice informed by the literature, but allowing predilections to be modified by the narratives presented.

Eventually, on the second reading, I developed these themes, sorted narrative accounts and noted similarities and differences between them. For example, nearly every teacher recounted how their trajectory of practice began, but these starting points were at different places chronologically because they associated their professional "beginning" as separate from their "disposition" that set them on a path to expert practice. Stories from phase one were then sorted according to when they occurred and how they related to a larger life-narrative.

A life-narrative analysis process uses each unique set of cases to "sketch out" themes, or steps, at a level that includes all of the participants. Unique variations and common sequences can then be identified and discussed within common themes. For example, McAdams (2011) uses a 4-step model for an "intellectual question" and traced it's trajectory from 1) early question, to 2) idealized image, to 3) a personal aesthetic, and finally 4) dialectic or conflict later in life (pg 20). These steps, because they were involving a different population and employed a different research agenda, were not reflective of the PD trajectories teachers shared. I used the second reading to make sure all of the narratives could find a theme that was part of a life-narrative for this unique population. I sketched out the following 5-theme model:

Theme 1: Beginnings
Theme 2: Dispositions and Transformation
Theme 3: Experiences
Theme 4: Refinements
Theme 5: Convergences

The sorting of the narrative data into themes was central to both the design of phase 2 data collection and the analysis process. To make this process transparent the following section seeks to clarify each theme and clues for analysis. I will review the working definition of each theme and provide examples of indicators from one participant, Peggy, which served to sort narratives into each of the themes.

Beginning Narratives: A beginning narrative is defined chronologically as being prior to actual teaching responsibilities and also thematically as it describes training that prepared, or distracted, the participants for classroom practice. These narratives provide perspectives on what resources and experiences were relevant or useful to the teacher, what they considered as training, and how they were prepared for classroom practice. For example:

> "I started on my journey in education and the more I learned, the more I thought I needed to get them younger. I needed to start them learning and loving learning younger…I at this time, had finished my degree using a word processor. I walked into my classroom all primed with my

> multi-cultural background and ready to have my cooperative groups in my room and the principal closed the door and said, 'here's your room. I'll leave you alone.'"

Notice that Peggy starts the narrative with "I started" and expressed what she learned prior to entering the classroom. She volunteers her use of technology, but not as part of her classroom practice, this use is toward degree completion. She also expresses two lessons gained from pre-service training "multi-cultural" and "cooperative groups" that she later defines as less useful in actual practice. In another narrative she expresses perceived value in that she was able to design her own degree in an alternative certification process, "It's a very rigorous process in designing this degree". These narratives both set the stage for the rest of the stories she will tell about technology, the relevance of her training and PD, relevant experiences, and her relationship with school leadership.

Disposition and Transformation Narratives

Theme 2 narratives account for the teacher's beliefs and perceptions of where their innovative practices began and stories that accounted for how they started on their current trajectory of PD. This was not chronologically defined as teachers held both predisposed beliefs and experienced transformative moments later in their careers. Teachers reported dispositions that both predated their

teaching careers and transformations of belief mid-career. Where Beginnings tell of training prior to teaching, Disposition and Transformation narratives speak to beliefs that set teachers on a trajectory of innovative practice. In chapter 5 I'll show examples of both dispositional stories and transformative. Dispositional stories were identified with participant statements like, "I've always wanted to be" or, "I had an outstanding teacher" that made clear the participant perceived themselves to be on a single trajectory toward expert practice. Peggy, however was an example of a transformative case:

> "Now these were 3rd graders and again, I wasn't bold and brazen, I was naive. I went to class one day, I opened up the boxes. I did the heavy lifting. I took the four step schematic out of the box and put it on the floor for the kids and within ten or fifteen minutes they had the six computers set up, connected to the internet and we were off and running… It was crazy. So, I realized when I saw those kids who were fearless and they were looking at me like what's your problem."

This narrative shows a transformative moment in Peggy's professional life. It occurs after she was a practicing teacher, prior to public recognition for practice and she identifies this as a key moment in her beliefs about practice. Further, she defines herself as "naïve" and then she "saw"; she "wasn't bold", but then she "realized"; and she ends by implying that she had a problem and needed

solutions. This transformative narrative is a starting point for new beliefs about her role as a teacher. How she grows from this point is expressed in experience narratives.

Experience Narratives

Experience narratives were defined broadly as any narrative that described a PD event and/or expressed the relevance, conditioned relevance, or irrelevance of both external and internal learning after they began teaching or underwent a transformation of belief toward their current practices. Experiences built up to, informed, supported, and/or deterred teachers from their exemplary practices. These narratives composed the bulk of the data set so I further divided this theme topically: Experience of PD, Experience of technology, and Experience of leadership. Here is the set up for a collection of experiential stories that Peggy shared about the time between her transformation and her recognition as an expert practitioner:

> "So a couple of us, just on a whim, four years ago, said, well, the one game the kids are always talking about is World of Warcraft. Why don't we just buy the game and figure it out. That's what we did."

In this case, Peggy is describing her experience with a virtual world or digitally mediated resource after she realizes student agency with digital media

(transformation) and prior to being a national speaker and writer advocating for virtual worlds as a learning tool in the classroom. Her experience can be tagged as amidst a community of people, “a couple of us”; learning from student interests, “the kids are always talking about”; and being willing to try new things “why don’t we just…figure it out”. These specific PD resources can be defined, as ‘relevant’ to Peggy’s trajectory of practice because she chose to highlight them in her narrative description of her own personal PD experiences. In phase two of the study, incidental references to student interests, for instance, informed the addition of prompts asking, are you “learning from your students about new ideas, tools, and projects?” amounting to 25 specific resources for PD 16 of which had sparse presence in PD literature.

Refinement Narratives

Refinement of practice narratives were identified as those that described iterative design practices, beliefs, and processes on the part of teachers. PD growth did not end when teachers were awarded, they continue to grow and learn. These were stories that were also chronologically defined as after they received an award or recognition for which they were selected for this study. Though the protocol did not solicit these narratives, teachers often wanted to tell stories that were more current in their lives. For instance:

> “The main focus of my energies right now is finishing up the curriculum with the World of Warcraft, the school program, as an English

> elective and really getting it set up so that over the summer, I can revisit it, go through it again and create a second shadow curriculum using LOTR for those schools who don't have a budget…"

The use of "right now" identifies this as at the time of the interview, or after public recognition, and "finishing up", "I can revisit", and "through it again" show this narrative to be iterative in nature. Peggy is clearly refining her technique after arriving at exemplary practices.

Convergent Narratives

Like refinement narratives, teachers would also offer non-prompted stories about their growing theoretical perspectives on teaching. Where refinement narratives are about growth, these narratives express conclusions about the convergences of ideas, tools, and communities toward a worldview. Expert practitioners in this study were well versed and ready to volunteer their epistemological, curricular, and pedagogical conclusions about teaching and learning. Here is an example of a convergent narrative:

> "The kids are a guild, so there is this one for all and all for one kind of questing we can't give up and the fundamental underlying mission of this, for me, is for kids to realize "failure is a necessary step to success." That without it, you haven't done any risk taking and without it you really haven't tried your hardest because we

> applaud kids now in this environment. We applaud when something doesn't work and they try it again."

Peggy is speaking in the present tense so this narrative occurs after her award winning practices. She also starts to talk to the interviewer using "you" and "we" implying that she is sharing beliefs that are beyond her own personal trajectory of growth and converged to the point of sharing with others. She has refined both her practice and beliefs to direct, clear, conclusive statements. She also uses words like "necessary step" and "we applaud" to define her tools and ideas about practice showing she has identified, or converged learning to, core concepts behind her practice.

This study focuses on only the first three themes that address the trajectories *toward* expert practice. These findings are in chapters 4 through 8.

Coding stories using these definitions usually followed the protocol questions fairly well, but teachers would at times share stories out of chronological order, remember past events during another narrative, or override one story over another as different cognitive prompts were employed. In these cases, the teacher would provide clear prioritization, like "Oh no, that's not where it started, it was…" for coding of the data.

Phase 2: Justification Analysis

After organizing the self-reported narratives of phase one, and interviewing an expanded set (phase 2) of exemplary teachers, I was able to analyze the larger set (both) in three ways. First, narratives could be sorted by categories, as was done in phase 1, that either confirmed phase 1 themes, added nuance to the themes, or provided contrary examples. Of the deviant cases, the stories could be organized further into types that may not have been captured initially.

An excellent example of this occurred during phase two analysis of Beginnings. In the initial sample, none of the teachers claimed to have experienced a traditional certification program. This oddity was either a coincidence of the small sample, or these deviants from expected trajectories of PD actually represented a larger trend not yet noticed in the literature, as most teachers in this country still receive certification from traditional 4-year teacher education programs. This of course was potentially an interesting aspect of Beginning narratives among early adopters, however when looking at the larger sample of expert practitioners, some did go through a traditional four-year certification process – though the balance was still far from representative of the national percentage of teachers beginning training. I'll detail this in chapter 4, for now this shows how the larger sample may reveal more detail about a theme, inform findings, and help to justify cross-narrative claims being made by the phase one expert practitioners.

Of course in cases where these narratives agreed and the justification

analysis confirmed that they were more widely agreed on by the larger sampling of expert practitioners, these findings were worth reporting on in the following chapters. In the reported findings, teachers held a common agreement across narratives that I attempted to simply represent accurately.

Second, a smaller tally analysis captured if various PD beginnings, trajectories/dispositions, and experiences were part of the teacher's PD trajectory. After phase one discovery of PD resources, I was able to refine the protocol (Appendix 5) to directly ask if specific PD resources were 'relevant', 'somewhat relevant', or 'irrelevant'. These were tallied to measure the degree to which the larger sample agreed with, modified, or disagreed with the phase 1 teachers. Data provided evidence of effective features of PD (Desimone, 2011) useful for a larger conversation. Strong perceptions of relevance across narratives warrant further, and more specific, inquiry than allowed within this scope of this study that seeks only to identify and color some detail of emergent resources for PD among expert practitioners.

In an expanded study, these could be resorted to test for inter-rater reliability, however the narratives were fairly straightforward in this regard. These stories were gathered and isolated for each data point for sorting and thematic arrangement. After using the full narratives to check for deeper understanding of the themes above, using the same sorting process as phase 1, phase two justification data also provided feedback on the components or resources noted in phase 1, these were coded as 'relevant', 'conditional' or 'irrelevant'. Teachers

in this study were usually opinionated and provided answers that were clearly confirming or denying the relevance of PD.

For instance when asked, “Are staff meetings relevant for your professional development?” a typical positive, or “relevant” assertion would be, “Oh absolutely, I look forward to the time with colleagues,” and sometimes a story to exemplify the assertion. This teacher valued the time with colleagues and the following story provided examples of how this time changed their practice.

On the contrary side, teachers would typically express that a particular PD strategy or resources was ‘irrelevant’ with curt, short responses like, “Learn from? Probably not”, “I’m in, but I’m not active”, or even just, “No, I would say no…” followed by a pause waiting for the next prompt.

‘Conditional’ responses were coded as such if the teacher either provided a conditional answer like, “If I know that it’s going to be, yes”, “Yes, good and bad,” or “Not usually, but I have had some good ones.” These conditional statements were more easily coded.

The second instance of a conditional response was when an individual’s narratives conflicted with each other or when one story claimed a resource to be relevant and another didn’t. These participant’s stories were coded as ‘conditional’, despite the narratives providing unconditioned language, to better reflect the teacher’s perspectives. For instance when asked about the influence of digital networks on their practice, teachers may initially say they were not relevant, but then later in the interview, share how they get “lots of great ideas”

from digital communities they have joined. These inconsistencies were fortunately infrequent, but explain why data could be coded as ‘conditioned’ when at first glance there is an unconditioned response in the transcript.

One consideration for future study is that these inconsistencies could be read as the participants not being familiar with the scope or instantiation of the topic. Digital communities, online idea banks, video archives, and many of the emergent tools may be understood minimally, or in very different ways. Instead of implying that these few teachers were inconsistent or somehow disingenuous, a better representation is that in different points of the interview they were actually thinking of different narratives and tools that had delineated between themselves.

When in doubt, I erred on the side of a ‘conditioned’ response in order to both allow for error and to maintain the integrity of teacher voice in the clearly unconditioned responses.

After coding the narratives by theme, I pulled them and began to sort the ‘relevant’ stories by the teachers presented. For instance all stories involving school leadership (chapter 8) were gathered together, then sorted into categories that represented the *ways* in which leaders or leadership tasks were relevant contributors to their trajectory of learning. This final step added further description of for each relevant PD resource and provided descriptive clarity to the second phase that both mirrored and came full circle to with the context of discovery narratives.

Note: Collective Intelligence

Inspired by literature for this study that explored the value of participatory cultures, I chose a unique method of getting feedback on the methods and analysis of the data leveraging the collective intelligence of an online community. I named this dissertation the 21st Century Teaching Project, and gave it an online presence to open a conversation about the selection, methods, and findings involved.

For each theme I took advantage of an invitation from Scott McLeod (2011) to share preliminary findings with a larger community of education leadership and policy experts on his blog http://dangerouslyirrelevant.org/. Both researchers and practitioners that follow McLeod's blog (28,000+) were able to provide constructive feedback on the methods, findings, and discussion, which further refined the study. Commentators were presented with the ability to 'tweet', 'like', 'save', or comment on posts collectively - some of which have been saved and added to the appendices.

Knowing that this is an unorthodox method of verification, I noted on each post that these were *preliminary* parts of an ongoing dissertation and welcomed comments and suggestions for refinement of the study. No incentive or offer of credit was offered to the community. My expectation was to find one or two interested parties to discuss findings with. Readership counts were in the thousands and hundreds took the time to rate or comment on each of the posts.

Verification of the data has been a surprisingly (and welcomed)

collaborative process worthy of a study in itself. Had I been aware of the ready and willing community around the work, I'd have planned more accordingly to capture data from the process. For instance, I must give credit to the McLeod community, but lack established reference points or real names to do so. Indeed, much needs to be explored along these lines, also called for by Michael Nielsen in his book *Reinventing Discovery* (2012), surrounding collective intelligence, collaboration, authorship, expertise, democratizing science, and open-science research.

The following five chapters will be organized according to the methods used to collect the narratives. First, each theme will be introduced and defined according to phase 1, *context of discovery*, narratives. This provides an overview of teacher perceptions and I'll highlight these with a representative example. Then I will present the phase 2, *context of justification*, findings in light of how they confirm, adjust, or provide detail on the preliminary findings. I provide tallies of coded narratives to represent the trends among the expert practitioners and visualize teacher perception of PD themes and resources. Each chapter concludes with a preliminary discussion the thematic findings.

Chapter 4

> "You know, I have a lot of conversations with people about that because it's definitely not the way most teachers choose to go... most teachers choose curriculum and instruction."
>
> - Teacher

Findings: Beginning Narratives

Beginning narratives were those that illustrated a teacher's training and professional development *prior* to their first day in the classroom. Traditionally, certification marks the beginning of a teacher's professional development trajectory because it is assumed that this is where core skills are gained that are relevant for classroom practice. Any and all narratives that teachers shared regarding pre-service training and preparation for the classroom are what I call 'beginning' narratives.

Trajectories may change or alter in practice, but are influenced by how teachers were trained initially and the degree to which that process sets them on their current trajectory or away from it. Ideally, teacher preparation and certification provides a foundation on which lifetime learning and ongoing PD will occur. I will show that most award-winning teachers either do not report they attained this foundation in certification in a traditional 4-year program, or they shared narratives that claimed their primary, or most influential, training occurred outside of the field of teaching altogether. Overall, the narratives indicate that the certification training was a positive influence on their current practices only a small percentage of the time.

Phase 1: Context of Discovery

Initially getting a foundational understanding of the background of each teacher was more to provide me with context and allow for the chance that especially potent training programs were influencing teacher practice over time. When I asked about their primary training for the classroom however, all of the phase one participants shared stories about how they had unique or alternative experiences prior to entering the classroom.

Early in the interview I asked teachers to start from the beginning, or express the foundations of their innovative practices. These stories were captured after the following prompts in the protocol:

- Teacher training (undergraduate work)?
- Practices or resources do you consider most influential in your professional development?
- Philosophy of teaching?
- Where do you get your ideas and passion for new practices?

Beginning narratives were sorted by emergent themes and points of divergence during the context of discovery and then quantified in the larger sample in the context of justification.

In the discovery phase of the study (n=8), or phase one, the first and most obvious thread that emerged was that these teachers didn't report a traditional path through teacher preparation. Instead of good grades in high school and four undergraduate years in an education department, something "unorthodox" was

happening. For example, Peggy was not sure she was able to speak to certification designs because she wrote her own:

> "I hope my experience will be useful to you because I feel that it's rather an unorthodox journey that I've had in education. My formal education just didn't seem like a necessity to me. It seemed painful, uninspired. I was disengaged. I was falling through the cracks… it was a shock to me when I went to get my records in order and found out that I was a high school dropout… What [University] allows you to do is pretty much write your own degree plan."

Peggy wasn't alone however. Among the first seven discovery interviews, *none* of them participated in a full four years of traditional teacher education. They represented a growing population of teachers getting certified in alternative certification programs. Peggy was an accidental "high-school dropout", Jeremiah shared that he has never found the time or need to get certified because his doctorate work in history has served him well as a history teacher, and the others talked about the influence of training in other professions before attending a streamlined (1-2 year) certification program. Jim, for example when prompted, chose to back up to "origin" moments that were influences on his practice:

> "Originally I didn't get my teaching license. Originally my goal was not to be a teacher. I did a lot of fishing and hanging out along the river that I grew up on. I was really interested in possibly getting into running or working at a community center and building community via athletics."

Andrew specifically found ways to take courses with hands-on projects, regardless of topic matter, because the learning style he used mattered more to

him than the content. In this way, he designed his own program that avoided lectures and found what he saw as relevant tools across disciplinary areas. Content was less important to him than tools used and products produced.

> "I remember crashing and burning real bad on what I would consider traditional lectures. I gotta remember the content, I think I've blocked most of it out [laughs]."

Teachers recalled alternative paths to certification and identified themselves as the unique or exceptional in all eight cases.

The purpose of phase one, or 'discovery' is to identify phenomena and shape interview protocol that will efficiently target interesting topics with a larger sample set. The alternative narratives to traditional certification composed a theme that needed focus in the justification phase of the study. If the initial group felt their journey was unique, than my expectation is that the strange concurrence would be shown or dissolved in the larger data set – in this instance the trend is clearly confirmed.

Phase 2: Context of Justification

During phase 2, the same protocol questions were used to inquire into beginning narratives. All interviews (n=39) were then used for final analysis. Each of these narratives was coded based on the type of program they were part of, it's relevance to their current practice, and what other foundational experiences teachers recounted.

Four types of narratives encompassed the data set about teacher training and preparation beginnings. I will define and provide a representative narrative of each:

1) Traditional (4yr) - Teachers were trained in four-year teacher preparation programs and found them to be the 'beginning' of their trajectory of innovative practice.

> "My undergraduate program was catered for P-12 instrumental music and I do a lot of vocal things to so I took some classes for that. Then my master's degree was geared for vocal music since I teach elementary... Very important because it gave me that base line knowledge to understanding children, how they learn and what I needed to do to facilitate how they learn."

2) Traditional (+Hobby) – Teachers were trained in four-year teacher preparation programs, but didn't identify them as providing 'beginning' points for their trajectory of innovative practice. Instead they shared that a hobby, skill, or interest in another field provided them the basic tools they needed to teach.

> "I remember taking accounting classes just because they used computers. I had no interest in accounting whatsoever, but it was all computerized and so I thought, 'ya, I'll take that.' Anything that would be digital, even in my undergraduate degree, I was taking psychological aspects of art as a course because it was a prerequisite for Photoshop, one of the early Photoshop classes..."

3) Transfer/Certification (1-2) – Teachers were trained formally in another profession and transferred into an education program after a change in life-trajectory, or they participated in an alternative certification program in order to begin teaching. These teachers expressed the previous training or alternative certification provided for the 'beginning' of their trajectory of innovative practice.

"My undergraduate training I have a bachelors in British literature... I did not have a teaching program … and part of it's my philosophy, I think a teacher should major in their content area. I don't think they should major in education."

4) Break/Other Profession – Teachers were at times already in the classroom but wanted to make clear that they were on a different PD trajectory prior to leaving the classroom - either as a break or to take a job outside of education. They didn't consider previous practice as linked to their current trajectories and redefined the chronology starting point of their practice. These narratives identify the break or other profession as the 'beginning' of their trajectory of innovative practice.

"[I] got a couple of jobs outside of education after that first year and then ended up going... for a year of aviation and pilot training... I worked for an airline for ten years, Northwest Airlines, and then some of those jobs in between

> were working in a factory, making culvert pipes for roads and also delivering caskets to different funeral homes."

Because beginning narratives are in only part defined by chronology, this fourth type of beginning required that the teacher indicate, without solicitation that they didn't consider their certification process to be their starting point. For example one teacher said,

> "I don't care what school you go to, it really doesn't prepare you for what you are going to do in the classroom... Let's back up. I spent a year in England…"

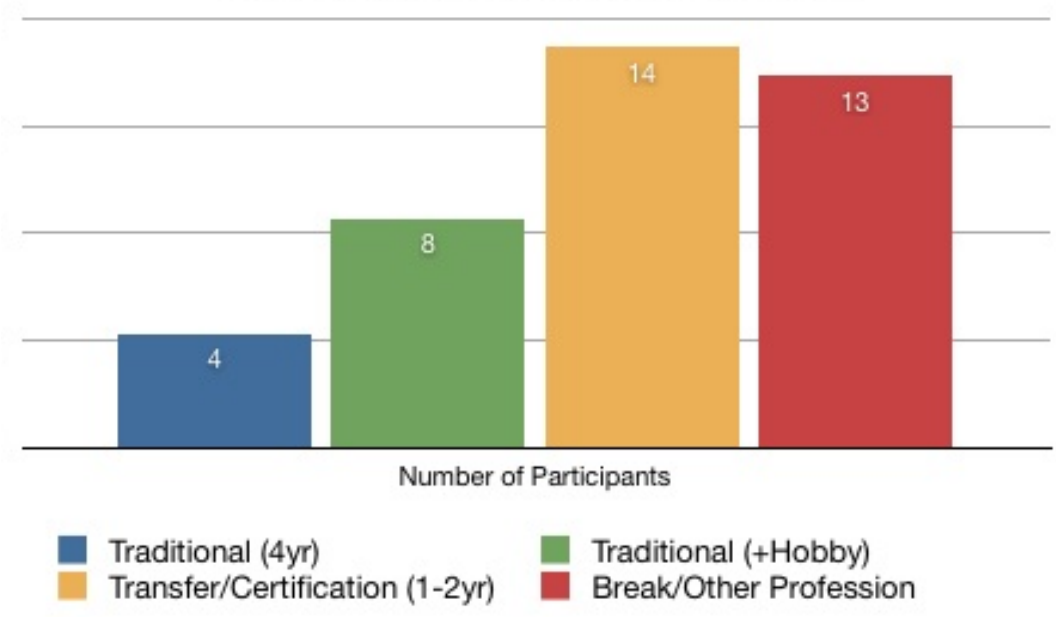
Here he both denies the relevance of course-based teacher preparation in his own experience and relocates the timeline of his trajectory of practice to have a starting point that occurred during a break in his practice. Of course, my favorite example of alternative training was that of Allen, a teacher in his seventies, whose life journey moves from working on the theoretical physics to programming operating systems in the 80's, but losing out to 'that Bill Gates fellow', and beginning his professional life working on the Manhattan Project:

> "By the way, in addition to my background in aviation and physics, I have a degree from Princeton in electrical engineering but I was fortunate enough to be there in a time when they were experimenting with a dual engineering physics curriculum. We were research and development on neutron generators - which we used to initiate atomic bombs… You see my background is not a typical teachers background."

No, not typical at all. However, among the 39 award-winning teachers, 13 of them pointed out that a break in teaching and/or work in other professions provided them with beginning ideas, beliefs, and PD that started their innovative practices. These were teachers with uniquely exceptional stories and trajectories of PD.

Twelve teachers were traditionally trained, however eight of those specifically noted that this training was “skimming” what was really needed for teaching or redirected the conversation away from their undergraduate studies toward hobbies or other professional training.

FIGURE 4: Teacher Training and Preparation



	Traditional (4yr)	Traditional (+Hobby)	Transfer/ Certification (1-2yr)	Break/Other Profession
Beginning Narratives	4	8	14	13

The other twenty-seven of the participants did not become certified through a traditional four-year teaching certification program. Fourteen participants either enrolled in 1-2 year certification programs or trained in another field of study and transferred into a certification program after a change of plans. These teachers often expressed conviction around their training and wanted it clearly noted that their expertise arose from some of these alternative paths.

> "I worked in a program called Industry Initiatives in math and science education. In the summer time I would place with the scientists at NASA and we were designing curriculum also using computer applications. My undergraduate training I have a bachelors in British literature... I did not have a teaching program … and part of it's my philosophy, I think a teacher should major in their content area. I don't think they should major in education."

Expertise and experience *outside* of education prepared them for, ironically, national recognition *within* the field of education. The capacity to teach and encourage learning for expert teachers was closely tied to the life-experiences they enjoyed. The value of these life experiences was to bring fresh, new ideas into their classrooms in a way that wasn't necessarily part of their certification process.

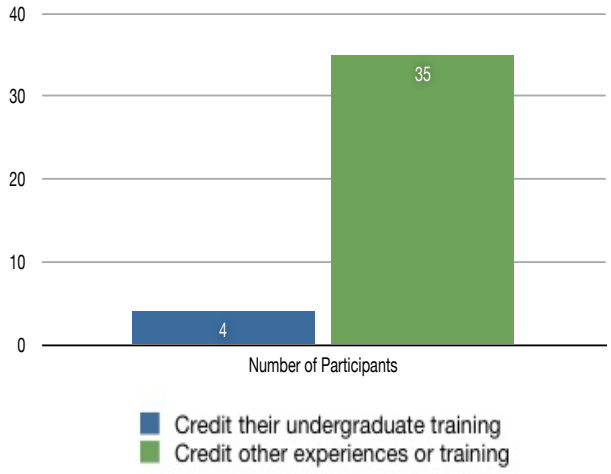
> "I actually started out in the recreation management field working with a degree in records and management up at Estes Park. I own a fly-fishing business up there. It has informed my classroom quite a bit... I brought that into my classroom. The

> way I teach fly-fishing, the way I engage people teaching fly fishing I do the exact same thing in my classroom."

Although these could be broken down into further specific fields of expertise like homemaker, professional career, or various; it is the credit they place on another profession for their primary training that separates them from the other non-traditional certification stories.

Overall, the study found twelve traditionally trained teachers among the participants and twenty-seven teachers with training in other fields. Four of the thirty-nine teachers reported traditional undergraduate training prepared them for the classroom; eight teachers credited a hobby or outside interest was more influential than their undergraduate work; fourteen were trained in another discipline, and thirteen had other careers, or a break from the profession, that they credit primary training and starting points for their exemplary trajectories of practice.

FIGURE 5: Participant Allocated Credit for Innovative Trajectory of Practice



	Credit their undergraduate training	Credit other experiences or training
Beginning Narratives	4	35

Summary and Preliminary Discussion

More than two million teachers are needed each year to staff public schools. The number of teachers from alternative, less-restrictive, certification programs has nearly doubled from thirty-five thousand (NCEI, 2005) to over sixty thousand (Garcia & Huseman, 2009) in just a few years. Despite rapid growth in alternative certification, these teachers only meet 3% of the total teacher need. However, non-traditional certification accounted for nearly 70% of the award-winning teachers in this sample.

Traditional undergraduate programs were signaled out as not particularly relevant beyond the student teaching or 'in-school' time that they allowed. The course work was consistently described as irrelevant to good practice and at times even contrary to what teachers believed to be good practice. Commonly expressed in sweeping terms:

> "I learned more in my first days of student teaching than I did in almost all of my education classes..."

This misdirection of traditional training, in these cases, led to teachers having moments of revelation later (next chapter), where they found that what they were taught to do, in their undergraduate studies, was contrary to practices that worked effectively. They are forced, by failed practice, to realize they needed to re-think what teaching itself looked like in the 21st century. Overwhelmingly, 35 of 39 teachers didn't see their undergraduate training as providing relevant contributions to their current practices.

Those teachers (69%) with exposure to alternative professions or hobby skills (or interest communities) appear to have a certain advantage in re-thinking effective and relevant educational models preparing students for their future jobs – and they are being recognized for doing it well.

> "I was at home with my kids for right around seven years... We're huge snorkelers. We always go out and camp out at the river or go down to the Keys so we like to spend a lot of time outdoors and in the environment. That finds its way back into the classroom. [Undergrad?] More so than a textbook but not like incredibly influential."

These teachers report models of what 21st Century skills look like outside of teaching, and they begin trajectories of learning that reflect those models.

Further, when asked what they learned from their undergraduate work, participants typically changed the topic or make sure the interviewer is aware how important other experiences were for them. This too follows that these teachers are updating their classrooms to reflect the changing world they live in, based on positive and noted experiences therein. This pattern of redirection doesn't show up as well in the tallied elements of this study. It also suggests that there is a clear disconnect between the pedagogies being taught in undergraduate programs and those that work with today's students – a topic that would require more study of those programs.

Often these exemplary teachers went out of their way to note not only how important external professional/hobbyist engagement is,

> "I lived in subsidized housing, was on welfare and food stamps and waited tables on the weekend and graduated... I think every teacher should go to nursing school... I think every teacher should have to wait tables too as far as like multi-tasking and customer service... I also think teachers should have to take acting 101… Nobody had prepared me for reality"

These narratives were often accompanied by an expression of how *unimportant* and even distracting traditional teacher preparation was to them.

> "I can tell you right now that most [classes] are worthless and the majority of where I learned from was me and calling people who are the same way and we bounce ideas off each other and try to implement it."

Often the profession teachers came from, would relate to the subject area they taught, for instance Allen, the nuclear engineer, now teaches science and the former journalists all teach writing. There are exceptions (one statistician teaching social studies for instance) in enough places however to cast doubt on any statistically significant findings amongst this data.

As life-narrative methodology is designed to do, these findings warrant expanded study and a deeper discussion regarding relevant PD design that will set teachers on a path toward exemplary practices. However, beginning narratives can be colored by personality, prior experiences, and dispositions toward the certification process. In the next theme, I review narratives that described both disposition and points of transformed practices according to teacher beliefs. This theme reviews *where* teachers found their training, the next

explores *why* and *when* these teachers started upon their current PD trajectories?

Chapter 5

> "I had the moment where I realized I was teaching the same way my teachers taught me in high school and I was bored then…"
>
> - Teacher
> -

Findings: Disposition and Transformation Narratives

Narratives that describe teacher beliefs and motivations build on a body of work mentioned in the literature review. I was interested particularly in those that teachers perceived set them on a course to expert practice. Disposition narratives express the teacher's beliefs and motivations that provided for exemplary professional growth. At times teachers had transformative experiences that changed these dispositions to a new set of beliefs and motivations.

As award winning teachers, all of them were recognized nationally for practices that had a starting point, yet this starting point, and the steps they reported in their trajectory of PD, varied across cases. First, I will identify four distinct trajectory *types* that the teachers narrated, then the dispositions and transformations that fit each. This chapter then summarizes the kinds of dispositions and transformations participants reported that started trajectories toward exemplary practice.

Phase 1: Context of Discovery

In the initial round of theme-seeking interviews, teachers were asked if they remembered how this trajectory began. How did they first learn about, think of, or start on a path that would eventually lead them to recognition? In a life-narrative analysis (McAdams, 2011), this preliminary question was intentionally designed to have the participant build a context for their practice so they became comfortable with storytelling – or set a foundation for a lively exchange.

In the review of professional development literature (above), the prevailing PD model rests on the premise that trajectories of PD follow initial training and well designed PD 'instruction'. Teachers are theoretically receptive of PD that leads to new knowledge, beliefs, and with guidance and generative context, new practices. Thus, I expected that among expert practitioners this one framework of PD would set the stage for most of the narratives, yet this basic model was only found among a minority of the teachers. If this 'essential' model was not descriptive of expert practitioners, than these teachers provide the right data set to identify new models of effective PD trajectories - and then start to identify experiences and resources that are relevant to teachers.

In phase 1, the context of discovery, a clearer definition of *four* models of trajectories of professional development explained teacher dispositions and transformations. After reviewing these, I will review evidence in the context of justification showing which were found in the larger sample.

Types of Trajectories of Professional Development

Four different experiences along a trajectory of professional development occurred in roughly equal parts amongst the sample. Later in the chapter I will show the distribution of these types and name them, however in the context of discovery I want to reflect here that I was seeking to represent the teachers accounts with models that were not identified clearly in the literature review. The first type of trajectory *was* the one expected; found in the framework from a *Primer on Effective Professional Development* (Desimone, 2011):

PD → New beliefs → New Practice

My findings corroborate this model, but only partially. A portion of the participants did experience transformative PD at some point during their career, a larger portion of teachers shared narratives that expressed alternative paths to new practices fueled by both negative or positive experiences and predispositions that *caused* the pursuit of PD *away* from traditional learning models. A typical narrative, for this kind of trajectory, was Pen's:

> "Taking part in the writing project was a first turning point and certainly that rural voice in country schools was the major turning point especially as teacher leaders. From that experience I gained a different perspective of what I could do and what other teachers could do and what we could do together… one of my colleagues and I looked at

> that little story running on the laptop and we were just on fire. We thought wow, we want to do this!"

Notice the teacher was "taking part" in a designed PD experience, she gained a "different perspective" or belief about potential practice, and then was motivated to try it - "We want to do this!"

The prevailing voice of effective PD however did not account for narratives that claimed 'failure' of practice as a starting point for PD. This trajectory looked more like:

Failure → New beliefs → PD → New Practice

These teachers explained that their shift in practice started with a failure of some kind during their career. While teaching, they recognized a clear lack of expertise and a break down of what they considered acceptable practice. This 'failure' led to a rejection of old beliefs and a search for new beliefs (PD) that would inform successful practices. For example:

> "I had the moment where I realized I was teaching the same way my teachers taught me in high school and I was bored then and I was looking at some of my students who I knew were bright and energetic, lively kids and I could tell they were bored. So I totally changed the dynamics of the class and found a way to make our writing actually do work… I think it's through having that moment of seeing that kid falling asleep in the back of your classroom and realizing that was you 25 years ago."

Here the teacher “had a moment” when their students were “bored, or a failure of practice, and they “totally changed” before they “found a way”, to practice differently. The designed experience doesn’t play a role at all in this trajectory, which would explain why this model is overlooked so easily by those that design PD experiences. However, for these teachers, it is no less critical to their award-winning trajectories.

Two final models are possibly overlooked for the same reasons, though the importance of ‘belief’ and ‘motivation’ are two well-documented realities in professional practice. These beliefs, or later I’ll call them dispositions, both related to a model of practice (positive of negative) that drove their PD trajectories accordingly. Positive beliefs about practice were founded in positive models teachers were seeking to emulate over their careers.

Existing beliefs → Seeking PD → PD → New Practice

As was the case with Cheryl:

> “I am always changing, moving things around, trying things differently… Do I think I was as effective then as I am now, no. I can tell you that I tried to be. I tried to do what I'm doing now… You can talk ‘til you're blue in the face but unless they are emotionally invested, they aren't going to learn it… I remember a couple of my elementary teachers. One, particularly, was really, really emotionally connected to us. She knew us inside and out… She was always

> emotionally there for us… I think that is the person I am trying to emulate."

These participants expressed a predisposition of being prepared with a set of beliefs toward lifetime learning. Cheryl wanted to make clear that her practices have not changed due to a designed PD experience. She held existing beliefs that she should try to continually grow towards an existing belief. She is "trying to emulate" an image of great teaching she attained well before entering the profession as a student. She goes on to say she is "*always* looking" for innovative practices, learning about them, and integrating ones that showed promise. In these cases the teacher knows what they want to be and see PD as ongoing growth toward that image. Any designed experiences that are contrary to what she sees as great teacher are not relevant and those that help her toward her goal are sought out without external prompting.

Finally, a fourth trajectory of PD also held a predisposition of a sort; only theirs was a contrary one. These teachers reported having a set of beliefs and models of practices that they wanted to find or design alternatives to. Their trajectory of PD is only slightly modified from the last one.

Existing beliefs → Seeking alternative models → PD → New practice

They also reported *always* looking for innovative practices, trying them, and integrating the most promising ones. Ben expresses the alternative "bias" well:

> "I would say that I came into education with a bias toward traditional education being a terrible model… which led me to a big portion of changing our grading system"

Joe's experience provides another example that better represents how these teachers felt that their PD trajectory happened over time:

> "When I entered the classroom, it was not a very democratic place… I'd say for the last fifteen years I've slowly progressed more and more into what I am today which is so much easier to teach and so much more a better atmosphere and there is no fear… It was definitely a progression.

Joe's preparation for practice was not what he imagined it needed to be, however he held no clear positive model for what he wanted – but he did have positive ideals. Over time he sought PD that would help him make his classroom less like a negative model (his own class) and one that had "less fear". In these cases, teachers may not have had a strong positive model to work toward, but knew what they wanted to work *away* from; like "a terrible model" or "fear" itself.

Phase 2: Context of Justification

Because these experiences were significant to the teachers, and novel in the literature, questions were designed for phase two that followed up on teachers' dispositions and shifts in trajectories of practices. All four of the above trajectory narratives were represented in the full sample set of (n=39) teachers.

Using these four models to explain trajectories of PD, all of the teacher narratives were accounted for. Four disposition types of beginning narratives were captured in the narrative analysis in roughly equal proportion. These include experiences that were either predisposed or transformed toward a positive or away from a negative model of teaching and learning. Using the above models from the context of discovery, on a second reading of all the interviews I sought I narratives that described a predisposition or a transformation: 1) Positive Predisposition, 2) Progressive Predisposition, 3) Internal Realization and 4) External Realization. In the second reading these four types were confirmed and further clarified. Next I will show summative terms for each and conclude the chapter showing the frequency in which they occurred in the study.

FIGURE 6: Disposition Types of Exemplary Trajectories of PD

	Growth *towards*	**Growth *away***
Predisposed: Growth over time	Positive Predisposition	Progressive Predisposition
Re-disposed: Moment of change	External Realization	Internal Realization

Positive Predisposition

Traditional wisdom claims that during the certification process, teachers experience and see what 'good teaching' looks like and have a strong mental model to follow over time towards it. They enter their first job with the attributes

they credit to enabling future PD. I call this a *Positive Predisposition.* For these teachers, they grew progressively over time towards what they perceived as "good teaching", leveraging attitudes and skills gained before they started.

> "I'm more the person who goes out and finds things and integrates it. I have never been a by the book teacher and even when I teach a regular English class like I did last year, an honors class, I'm pulling from the novels, I'm pulling from the original text, I'm integrating things.

These teachers are predisposed with positive models, attributes, or personality characteristics. As noted in the previous chapter, not all teachers enter the profession with training they consider sufficient or influential in exemplary practices. *A positive disposition is defined by a teachers' pre-existing trajectory of professional development toward a positive model or experience of practice established at the outset of their career.*

Progressive Predisposition

A progressive predisposition is defined by a teachers' pre-existing trajectory of professional development away from a negative model or experience of practice established at the outset of their career. A single phrase one teacher recalled that, "Even in my early teaching, I was looking for a different approach towards teaching and learning." In year three, this teacher was exhausted and took a leave of absence. Upon returning, he reported re-connecting to, "the stuff I enjoy doing outside of school…" Refreshed, he

was “always learning something new.” In this instance, the teacher grew over time, but instead of a positive internal model of teaching, this teacher knew what he didn’t want (a counter-model). Progressive predisposition set up a different sort of narrative in this case. He looked for alternatives to a negative memory of school, rather than working toward a model learned prior to teaching. In phase two, this narrative recurs. Tanya’s case is an interesting sample:

> “For me, I was naive in some areas and then comes a knowledge and understanding later… I was interested beyond the classroom in looking up stuff because I saw that there was stuff I could use in my classroom and so it was worth my while. The more I did that and the more interested I got, and the kids got more interested and it just sort of fed off that.”

Tonya progressively grew not because of a designed PD experience, a positive role model, or because she had a realization of failed practice. She is aware of her need to be “looking stuff up” over time because she had a predisposition that it was “worth my while”. Improved student feedback met a value, and she improved practice without a clear positive model to follow.

Positive and progressive predispositions are both types of predisposed trajectories that occur over a career, incrementally, iteratively, and purposefully toward or away from experiences and values of practice. In both types teachers felt they had ‘always’ been the way they are; either knowing what they want, or what they do not want and have been working towards that goal since they started teaching. PD trajectories of this sort are followed by slow and progressive

growth over time. Teachers report that they scavenge for good ideas, models, tools, and are constantly looking for growth opportunities that incrementally move them closer to a mental model. The difference was whether or not they were growing *away* from or *towards* a way of teaching.

External Realization

Trajectory beginnings were not always reported as a predisposition, however. In five of the six preliminary interviews, teachers could recall a moment or experience that changed their practice distinctly. Similarly to the first two trajectories types, some teachers also either grew *away* or *towards* a past practice or experience. *An external realization is defined by a teachers' changed trajectory of professional development toward a positive model or experience of practice realized during their career.*

When teachers were presented a new way of thinking or practicing, some reported the external influence as critical to their PD trajectory. For example, in the preliminary phase, a single teacher credited their social network:

> "Developing networking early on… Just sharing ideas, the basic web 2.0 type practices, ideas, tips, software with other educators within my state and increasing abroad. Shortly thereafter, within a year or so, I began to look at integration of video games and video technology into the classroom."

His social network was credited as the agent of change. Contact with other educators, outside of his local community of practice, fostered a mindset that

prepared the teacher to look at their hobbies as sources of inspiration. Involvement in the network predated trajectory-changing experiences. Those with an external realization credit their trajectory of practice to the influence of an administrator, community, policy, program, workshop, class, friend, or other external influence. They were not necessarily predisposed to figure out their innovative practice; interestingly they report changing trajectory *mid-career*.

For those that develop and design PD for teachers, this trajectory fits perfectly. Teachers experience PD, gain new knowledge, adopt new beliefs, and change practice. Indeed, this model of effective PD was found among expert practitioners and encourages efforts to provide PD for these types of teachers. However, we will see in chapter six that many of the external influences in addition to traditional PD sources.

Internal Realization

Of those four, the remaining four reported a beginning narrative that was a particular moment that changed their practice. These teachers reported an internal realization that defined their career path. *An internal realization is defined by a teachers' changed trajectory of professional development away from a negative model or experience of practice realized during their career.* The moment was more significant than their predisposition or outside influences because it connected a cognitive dissonance with practice (Senge, 1990), or

noticeable failure to perform, with a potential solution. These teachers reported that they knew their practice was lacking. Examples that illustrate this include:

> "I remember crashing and burning real bad on what I would consider traditional lectures."

> "We all love our field, it's so horrible to feel like you are torturing someone with the things you are passionate about."

> "I wasn't bold and brazen, I was naive."

> "I had the moment where I realized I was teaching the same way my teachers taught me in high school and I was bored then and I was looking at some of my students who I knew were bright and energetic, lively kids and I could tell they were bored."

Shifted trajectories started with a realization that current practices were not sufficient and needed new skills and practices to address. Contrary to Progressive Change, these teachers did not enter the profession with a mission to change, they engaged in practice the way they had been taught and converted in an "ooh-aah moment", a realization, and/or a "big horrible mess" in their classrooms that caused them to seek out PD in any form.

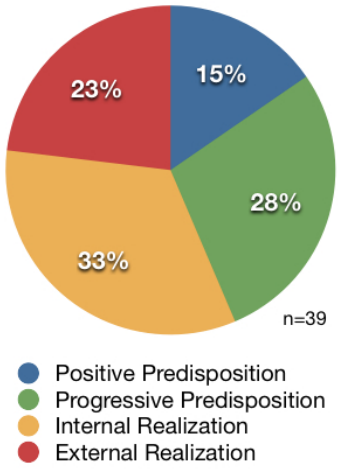
After the preliminary interviews the alternative beginning narratives were interesting enough to follow up on in the larger sample. Are all four represented in the larger sample? Are any of the beginning narratives outliers or

predominant? Finally, where phase two justifies these narratives, are there other narratives that were not captured in the smaller sample?

Distribution of Disposition and Transformation Types

A positive predisposition was the least common primary and mentioned narrative. 15% of the sample (Figure 6) claimed that they were trained and have always taught the way they do now with growing competency and a clear vision of good teaching. 28% of the sample entered the profession with a clear goal of progressive change of practice. Together, 43% of the sample set reported started teaching with a positive or progressive disposition of practice that led them *toward* exemplary practices. The other 57% of teachers reported changing their practices at some point *during* their career due to an external

FIGURE 7: Percentage of Disposition Types among Exemplary Teachers



	Positive Disposition	Progressive Disposition	Sudden Realization	External Realization
Teacher Narratives	6	11	13	9

or internal realization. Where an external realization (23% of the sample) was the second leading narrative account, it was first overall (29%) of those mentioned elsewhere in the interview.

Because teachers often noted a primary beginning point for their practice and later would "mention" other important influences, both were tallied as positive responses. In all narratives, more trajectory beginnings were mentioned than singled out as primary indicating the importance of one or more for each teacher. Here is an example of one teacher that shared two "Realizations"; first:

> "The summer of my first year teaching I went to an air force museum… and I went to a week long course there but it was all these different ways to bring flight into your classroom and for physics of course, that was very easy…"

Here the teacher experiences an external realization due to a designed PD experience. Later she recounts a progressive predisposition that was also descriptive of her PD trajectory:

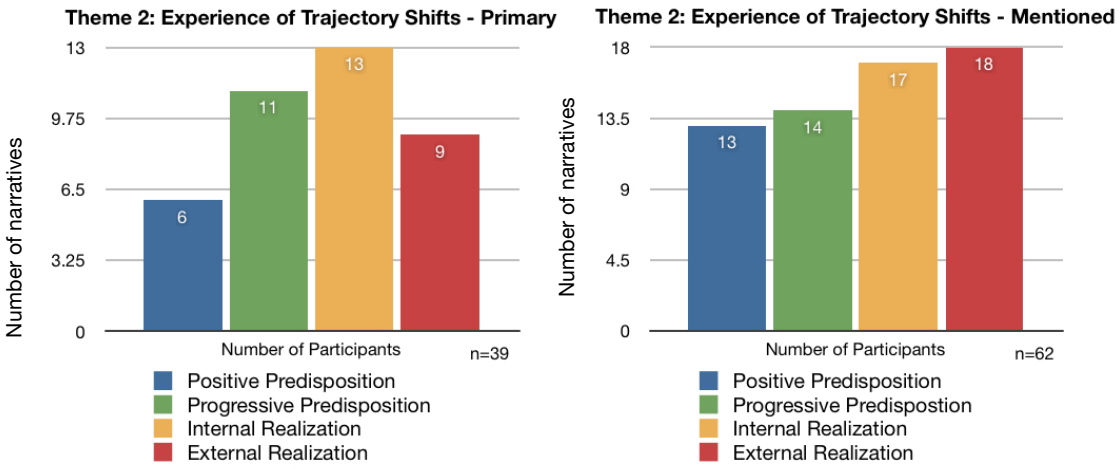
> "I mean when I first started teaching it I didn't have that many tools and tricks to do it any differently than the way I had learned… so it's a constant process to try to improve… I just did [it]. [laughs]."

In each of these cases the teacher would use phrases that identified one as 'primary'; making the other a 'mentioned' narrative, but not the one the teacher perceived as formative. For instance, the teacher above bracketed the first quote with "That particular thing almost happened by accident…" before and closed with "…is what kind of started this thing off… That led me…"; kindly pointing out the primary nature of the first, and making the second 'mentioned'. Another teacher, Patricia, stopped in the middle of the interview when she remembered a narrative that would replace her initial answer to the trajectory prompts:

> "Oh, I know what it stems from, wait, I need to back up. Stuff happens in your career. So the first thing that happened was…"

Because Patricia, and the other teacher, always gave similar indications, I was able to see that disposition and transformation narratives they considered primary were distributed slightly different from those they just mentioned.

FIGURE 8: Primary Causes of Trajectories of PD and other Mentioned Causes



	Positive Predisposition	Progressive Predisposition	Sudden Realization	External Realization
Primary P/T Narratives	6	11	13	9
All P/T Narratives	13	14	17	18

Disposition/transformation narratives were 'mentioned' slightly more than they were highlighted as primary. Meaning, for example, that a sudden change in practice could have been preceded or followed up by an external influence, but the teacher *credited* the moment as the primary influence on their PD trajectory. Coding was an attempt to best indicate the teacher's voice.

Finally, it should be noted that the analysis of beginning narratives were not exhaustive and analysis of the interviews could have been expanded beyond this component, thus likely increasing the tally of 'mentioned' further. Expanding this lens of analysis to will be conducted in future research.

Preliminary Discussion

Not only are four disposition/transformation narratives found among exemplary practitioners, but also there is relative balance between them conveyed in the data. Teachers entering with the expected positive pedagogical model to work towards were in the minority. Most of the teachers in this study found that traditional frameworks for 'best practice' did not serve them in actual practice. It was the adoption of, or seeking towards, new pedagogical exemplars that were reported as essential for award winning teaching. Instead of experiencing PD first, then experiencing transformation, many teachers experienced transformation and *then* sought out PD.

Teacher preparation programs, for predisposed teachers, were as likely to present a positive model of teaching as they were to present a contrary model of teaching. Transformative narratives were also a balance between *positive* and *negative* experiences that both drove teachers to positive trajectories of PD. The assumption that all teachers grow professionally from positive role-models or positive designed PD experiences doesn't fit with this data set of award-winning teachers. Over half of these exemplary teachers were on trajectories that led *away* from practices that they rejected or classroom outcomes they were not satisfied with and worked toward "something" better.

These teachers are all on trajectories of PD, but they may not be as homogeneous as we expect. They may not find 'relevant' the same PD resources

we have traditionally valued or benefit from those that are designed for them – not because they are 'resisting' PD, but because their foundational trajectory and relationship with PD is essentially different than we expect it to be. *All* of these narratives constitute an expert sample – these are not begrudging teachers. Their experiences of PD should be framed as positive growth models, because they produced the fruit of expert teaching that we would like to see much more of.

In the following three chapters I provide the findings of the experiences that teachers encountered along their PD trajectories. In chapter 6 I will compose a list of relevant resources (phase 1) and inquire as to their relevance across cases (phase 2), then in chapter 7 detail the ways and kinds of ICT resources that were found in the teacher narratives, and in chapter 8 I will assess the tasks and influence of school leaders on these teachers.

Chapter 6

> "Rather then reinvent the wheel there are already some teachers who are doing great things and so a lot of the sharing has been easier not just between teachers of the year, but strangers."
>
> - Teacher

Findings: Experiences with Professional Development

Professional development 'experiences' mark key influences on a trajectory of learning between dispositional or transformative narratives and arrival at practices that warrant refinement and convergence. Experiences are the focus of the remainder of the analysis in this study because they illustrate teachers discovering the practices that have defined the teachers as innovative and exemplary.

In chapter four, teachers clarified the core training and influence that set them up for a trajectory of PD. Next; teachers shared dispositions and transformative foundations for their trajectories of PD. In this chapter, I will highlight how teachers perceived formal and informal PD resources. In the following chapters I will review teacher experiences with digital media and leadership.

In phase 1, teachers identified lists of resources and provided key prompts for phase 2 where teachers were asked the degree to which PD resources were relevant, irrelevant, or conditionally relevant to their trajectories of expert practice.

Phase 1: Context of Discovery

In each of the interviews, participants were asked to share narratives that illuminated their PD journey. Then I provided a prompt for each of the PD resources identified in the literature review (chapter 2) to see if they could think of a time they inspired, informed, or influenced their beliefs or practices. The first round of interviews invited teachers to exhaust all they could think of that was helpful for their development. Instead of offering specific prompts, I sought a general sense of growth from these teachers and refrained from questions beyond clarifying sources for practices.

Teachers provided a collection of experience narratives that were valuable to them. In phase 1, my goal was to get a complete list of PD resources established in specific, vivid, narratives from the teachers. For instance, Lucas made his resources very clear:

> "I count my guild in World of Warcraft as probably one of my top professional development venues. My twitter and ISTE and my Second Life and my World of Warcraft guild are probably my strongest PONs."

Because World of Warcraft guilds are not a predominant topic in PD literature, I did initially ask phase one participants if they were involved in them. For phase two, however, I could add both 'Digital communities' and "Online experiences" as prompts to teachers so their perception of traditional PD did not preclude these

stories from the interview and I could capture emergent 'informal' and 'digitally mediated' resources (listed below).

This also meant that some PD resources *not* listed below were either 1) invisible to expert practitioners, or 2) not relevant enough to mention across both phases and all teachers (n=39) of the study.

Experience narratives constituted the bulk of the data set and teachers would often share multiple stories. For the context of discovery, the first order was to create specific lists of PD resources that could then be consistently prompted in phase 2 interviews. For instance, involvement in "Community Groups" is only mentioned by four of seven of the phase 1 teachers, but because these came without a specific prompt, it does not follow that involvement in community groups was not a factor in teacher's PD, just that it may not have occurred to them that it constituted PD.

To sort experience narratives according to the PD resources, I used both current practices and identified resources the teachers presented as valuable that may not traditionally be seen as PD. Some narratives spoke of PD resources already represented in the literature concerning PD as formalized and accepted assets to teacher professional growth. Henceforth I will call these established assets to PD "formal" resources because the *form* of their design is well established and readily available in the literature. In phase 2 I will show the recurrence of the narratives and their relative importance to teachers, in phase 1 I sought to list and define them. Formal resources include:

- Published materials – Including curriculum, books, magazines, and packaged PD materials.
- Staff meeting times – PD with building level colleagues during short meetings.
- In-service days - Set aside for PD within the district PD with building or district level colleagues in longer time allotments.
- Special assignments or committee work
- Workshops or conferences - Requiring a block of time to attend.
- Local colleagues - Using time to discuss teaching and learning formally or informally within the building.
- Course work of any kind following certification – Including master or doctoral work and certification programs.

The teachers introduced *other* sources of PD that were relevant in their practices. Over fifty times, regarding eleven different resources during phase one, teachers expressed that their PD came from alternative experiences not captured by the formalized resources above. In these narratives, teachers were inspired, took ideas from, were supported by, or received training that they claim *altered* their trajectories toward award winning practice. These resources were equally valuable to the teachers and were closely tied to their innovative practices.

Informal PD included any narrative that was not clearly part of the literature, formalized as a PD resource, or outside the scope of formal PD programming in school settings. Each of the following PD resources narrated as relevant to expert teachers was then added to the protocol for phase two interviews.

Informal Professional Development Resources:

- Community groups, clubs, boards, or other organizations
- Hobbies, entertainment based activity, communities, or pursuit
- At home play, family, or experimentation
- In class play, experimentation, or willingness to try out uncertain practice
- Direction from students via demonstration, suggestion, or direct PD
- Learning with students to understand a new practice, tool, or pedagogy

Formal PD, in the form of local colleagues and course work were noted with consistency, but the other formal PD resources were noticeably sparse from the first round of interviews – or even negatively expressed:

> "By the time the content is published, it's usually out of date."

> "[PD is] not some magic thing or workshop you have to take..."

Even though over sixty narratives of PD were shared in the first round, only eleven of them were positive associations with formal PD resources; one mentioned an assignment, one conference, four local colleagues, and five took graduate courses that influenced their practice. A trend of note in the discovery phase was the predominance of informal and digitally mediated learning for the teachers.

Informal PD resources were commonly shared. Teachers expressed the need to look outside of current practices in order to both stay current and get access to relevant ICT tools and skills for their classrooms.

> "I guess I'm feeling myself inspired at this point to look at totally new teacher leader models… I think the times when I had really effective professional development it came from people who were maybe no longer in the classroom but who had spent twenty years in the classroom… I'd like to see us as a society in general create a model for teachers with twenty to twenty-five years of experience where they have done well."

These examples highlight that instead of resisting traditional PD, expert teachers were still positively pursuing relevant experiences for themselves. The silence or open rejection of some PD did not equate with stubborn or stagnant teaching practice. Instead these narratives represent a predominant attitude of teachers seeking "inspired", "effective" PD and recognizing the emergence of "a lot of tools" that "weren't available" in year's past. The arrival of potent new resources for PD is presented as an opportunity for better experiences, rather than a challenge to formal resources.

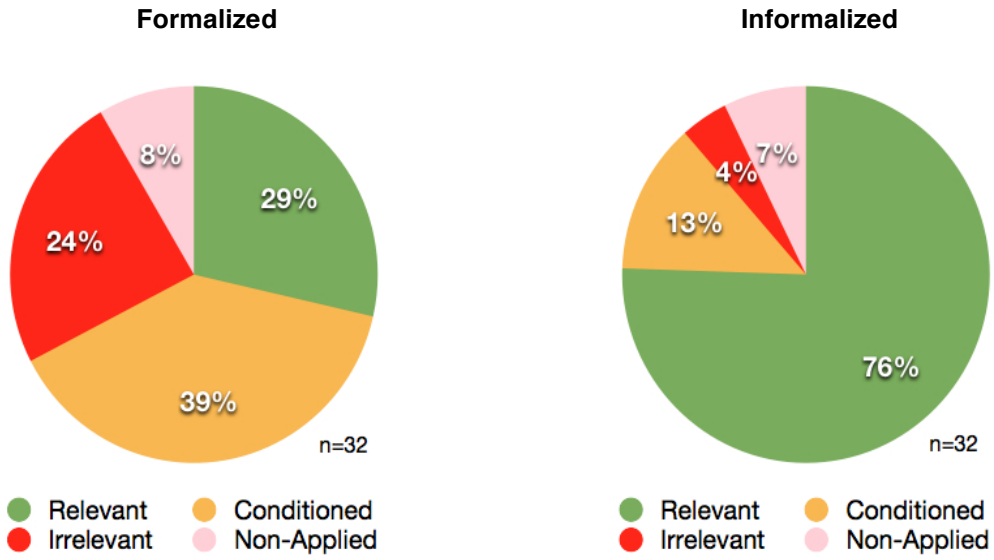
In phase 2, the context of justification, I added specific prompts for each, the data would show more completely the degree to which each resource was relevant or not among the sample.

Phase 2: Context of Justification

In this section I will discuss the analysis approach for the context of justification and show the findings for formal and informal PD along with some other themes that emerged in the process. The cross-case narrative comparison shows that informal resources are perceived by expert teachers as considerably more useful than currently formalized, or recognized, PD programming.

Because many of these prompts used were added after round one, only round two participants (n=32) were used for the justification data regarding experience of PD narratives. These added a more complete set of data for comparison between resources, however teachers would often tell more than one story about a specific resource especially when 'conditioning' their responses with examples of both relevant and irrelevant examples. The justification analysis looked for confirmation or contradiction of the relevance of formal and informal PD. Separating the types of PD shows that informal PD was more relevant to innovative teachers than formal PD resources.

FIGURE 9: Perceived Relevance of Formal and Informal Resources



	Formal PD Resources	Informal PD Resources
Relevant	64	145
Conditioned	87	25
Irrelevant	54	8
Non-Applied	19	14
Total	224	192

Each narrative was coded as 'relevant', 'irrelevant', or 'conditioned' based on the teachers' response. 'Relevant' and 'irrelevant' were only used when the teachers presented a clear and consistent answer like, "Yeah, absolutely relevant", or "Very little, not relevant". In some cases, teachers were not as decisive or presented two narratives that countered each other, these were marked as 'conditioned' because the teacher expressed conditional, mixed, or conflicting relevance

Despite the consistency of the protocol, teachers occasionally would shift

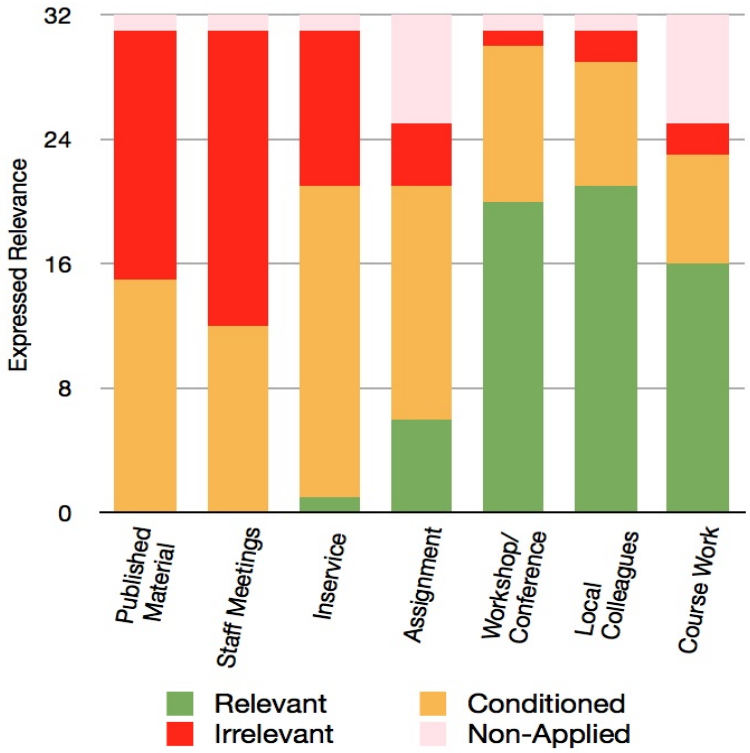
away from inquiry, and not answer a prompt. For instance, some of the teachers may not have taken graduate courses nor had any involvement in community groups, so when asked they would talk about local colleagues. In other cases, they may have experienced the PD but preferred to shift topics to things that *did* inform their practice, and finally some teachers were unfamiliar with the PD resource (like online video) and answered the question referring to a different resource. In all of these instances, the resource was not of value in their practice, yet they did not clearly state the PD was irrelevant either. In order to accurately represent their perspective I created a fourth coding element of 'not applied'. .

The remainder of this chapter seeks to organize and make meaning across a considerable number of these short statements of relevance across PD resources.

Formalized Professional Development Resources

Further looking at the data by each individual PD resource provides further clarity as to which resources were relevant and which were not per teacher. On Figure 10, data represents phase two teachers as data points – notice each bar totals 32. In cases where teachers shared multiple stories, they needed to consistently agree to be coded 'relevant' or 'irrelevant'.

FIGURE 10: Relevance of Formalized PD Resources per Teacher



	Published Material	Staff Meetings	Inservice	Assignment	Workshop/ Conference	Local Colleagues	Course Work
Relevant	0	0	1	6	20	21	16
Conditioned	15	12	20	15	10	8	7
Irrelevant	16	19	10	4	1	2	2
Non-Applied	1	1	1	7	1	1	7

Formal PD had the largest number of conditional responses. However the purpose of this study was to find what *was* relevant, so I will not dwell long on contrary findings. But there were some:

> "They would hire someone to come in and we would go and count light bulbs in the ceiling while the person goes on and on."

Some resources were clearly not relevant to trajectories of PD for these teachers, but to say that this kind of response was representative would be to not represent the larger sample well. Even the worst sentiments were usually presented with humility and diplomacy. Irrelevant and Conditional responses were usually examples of this diplomacy. For example, teachers would reframe the purpose of resources and people as not professional development related:

> "They are helpful to me to make sure kids get to the bus the right way but not for anything in the classroom. Look, when you are in a middle school it's rare that your administrators can actually be an instructional leader more than a in a very general way."

The 'in-service' day was largely dismissed or conditioned as depending on topic, presenter, style, timing, and the degree to which the time was hands-on. Or, despite variance in leadership and meeting formats, not one teacher was able to say that staff meeting time had been consistently relevant for their PD.

This is not to say these could not be more effectively used hypothetically; just that in general practice for these innovative practitioners, they were not. These teachers found paths to exemplary practice without these PD assets as relevant factors. This still leaves open the possibility that formal PD could yet remain more relevant for less innovative practitioners. However, following the tradition of past early adopter studies, this data at the least provides grounds to deeply question some assumptions about the relevance of specific formal PD

resources in terms of the cost and benefits that can be expected from them.

When teachers were able to leave the school for extended time on topic and training, formal PD relevance increased. Teachers found workshops, conferences, and graduate course work to be unconditionally relevant to their PD trajectory for at least half of the participants.

The most relevant resource of formal PD was access to and time for conversation with local colleagues or staff within the teacher's own school. Narratives included team meetings, hallway discussions, student teachers, lunch, book clubs, professional learning communities, and/or 'secret meetings' – as was the case for Paul:

> "We called ourselves the 'Tech Junkies' and we'd meet once a week… Every Wednesday we give up our lunch and we just talk about things like this. When I did this, my professional development took off because you are surrounded by other people who are really passionate about what they are doing. That would be the big turning point."

The irrelevant and conditioned narratives always referred to mandated time with fellow teachers and top-down control of the discussion and time. When the time is either structured systemically (part of the routine day) or left unstructured, these teachers used it for professional advise, encouragement, ideas, and support. The 'relevant' narratives were easy to spot:

> "They are the highest I can say. Very relevant."

> "Essential...I have a wonderful partner...a kindergarten teacher."

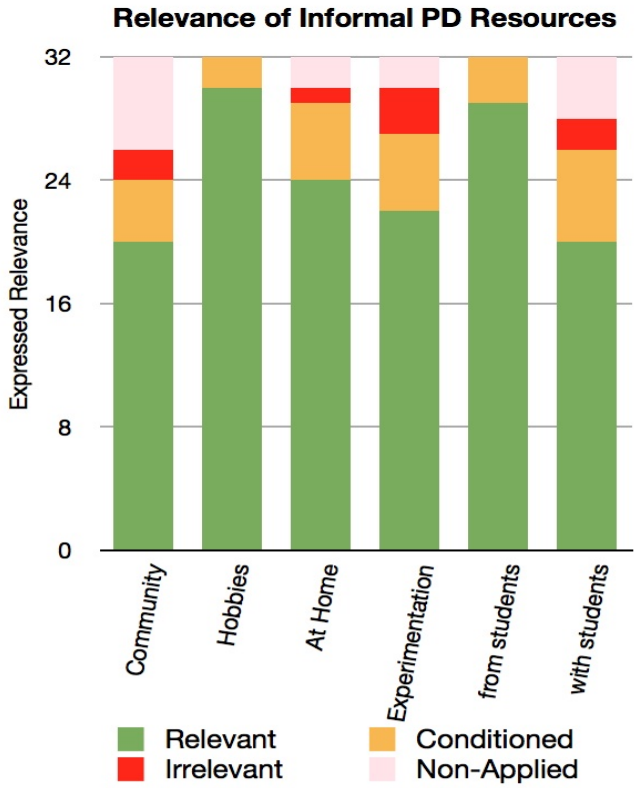
This agrees with previous work showing the importance of other teachers as an effective source of help and PD (Fullan, 2007). Though other teachers were important, they weren't the most relevant source of PD in this study. The relevance of informalized resources were less conditioned and more consistently framed as relevant by expert teachers.

Informal Professional Development Resources

Again, formal and informal are defined by their clarity as a PD resources in the literature. Informal resources are not necessarily novel, simply not typically included in designed PD descriptions. However, when asked about informal professional growth, teachers expressed a higher degree of relevance, and less conditioning in their responses (Figure 11). These data resonate with what was hinted at in the discovery process - that informal resources were more relevant than formal PD to expert teachers.

Teachers that were able to participate in community groups, hobbies, experiment at home, at school, and/or learn from or with students were able to find experiences that they reported as essential to their professional growth. 'Hobbies' and 'learning from students' are the only two PD resources in the study

FIGURE 11: Relevance of Informal PD Resources per Teacher



	Community	Hobbies	At Home	Experimentation	*from* students	*with* students
Relevant	20	30	24	22	29	20
Conditioned	4	2	5	5	3	6
Irrelevant	2	0	1	3	0	2
Non-Applied	6	0	2	2	0	4

that received no negative or null responses; only two and three conditioned responses were included respectively. Exemplary practitioners in this study always found relevant professional growth opportunities in their hobbies and their students.

> "Every single thing I do, every single thing, inspires me for teaching because you have got to bring the real world

> into your classroom."
>
> "[Fantasy football]... "I was doing fantasy math"
>
> "Students are the greatest source of professional development...

These expressions were typically clear. These participants were very self-aware of what they felt was valuable, and as expected, were ready to talk about what was valuable to them and identify each asset. For instance, Jim's unique trajectory of PD was aided by continual access to the community and people he found there:

> "One of the key things for me on that is this idea of building partnerships and relationships that extend beyond the school building and the current school infrastructure and capacity."

When asked what PD experiences and resources were valuable, teachers usually had clear language, like "one of the key things", to single out the resource.

Summary and Discussion

Overall, exemplary teachers expressed that formalized professional development was not necessarily relevant to their trajectories of learning and that informal relationships and resources were informing their practice in relevant

ways. Teachers expressed this contrast with consistency across both phases of the study with largely unconditioned affirmations.

Expert teachers were far less critical of formalized PD, than they were enthusiastic about *other* resources that were informing their practice in what they perceived to be powerful ways. The high number of conditioned responses for formal PD is best described as collectively diplomatic – these teachers wanted to talk about *positive* experiences and see the best in PD that was not necessarily valuable to them. Many negative comments were couched within expressions of positive PD – like conference attendance and published materials:

> "People come back excited about it because they are learning stuff that is relevant to me in the classroom. If you stop and think about some of the worthless things we teach to kids there is no wonder that some of them are bored. Good gracious, who picked 7th grade social studies curriculum?"

Informal and digitally mediated learning is not typically validated by school districts or found in the literature (see chapter 2). Though exemplary teachers are saying these PD resources are "hugely important", the traditional model of PD trajectories (see chapter 3) suggests PD should first be 'delivered', as an instructional unit, *to* teachers, then integrated. The relevant models of PD most cited here however require that teachers already have motivation, belief, and a model of practice from which they can leverage assets that are found both within and without of the school setting. In these cases teachers *seek* PD, rather than

receive it. Teachers would recognize expertise elsewhere and use it to fill gaps in their own professional skill set like Jim did:

> "[She was] someone who came out of journalism and actually used to work in television and she was the one who was originally really the most interested in doing documentary video type stuff. So having access to her expertise and passion really amplified what I was already interested in so that was a good fit for me also."

Finally, this sample set is representative of award winning teachers that may skew the findings toward those with active learning habits, exceptional abilities, and positive outlooks on practice. Less positive results would be expected in a larger study of mainstream teachers (Becker, 2000), however comparison of two such studies would further shed light on a developmental model of practice that may reveal a growing gap between traditional PD for teachers and emergent resources that these teachers are uniquely leveraging for expert practice. These teachers excited in a way that only comes through on the transcripts some of the time:

> "I've been telling everybody who will listen [laughter] about something that I've been talking to others online about."

A collection of these enthusiastic moments occurred when teachers were talking about digitally mediated resources. In the next chapter, I deal with these findings separately.

Chapter 7

" I don't know how I taught without it. It's an amazing tool."

- Teacher

Findings: Experience of Information and Communication Technologies

Experiences of ICT included professional development narratives involving a formative encounter with or use of digitally mediated resources that occurred between an initial disposition or transformation and the teacher being recognized publicly for exemplary practice. These stories of PD all were possible because of digital technology, tools, and capacity in recent years to enable teachers that used them. This chapter will show that the nation's expert teachers are first experiencing digitally mediated resources as a pivotal part of their professional trajectories of practice, *then* being noticed as expert practitioners.

21st century skills were not just things that teachers taught, in these cases, teachers used and exhibited 21st century skills as defined in chapter two. In phase 1 I will show the context of discovery revealed five types of narratives relating to ICT; that were then prompts for the interviews in phase 2. Similar to the previous chapter I will sort narratives per teacher to show collective perception of relevance. During phase 2 digitally mediated resources were shown to be the most unconditionally positive PD experiences for teachers. Finally, this

chapter will open many questions about the use of ICT by expert teachers and I will show how ICT varies even among teachers that report its value in their PD.

Phase 1: Context of Discovery

The discovery process unveiled that teachers claimed relevant professional growth opportunities in their use of digitally mediated resources. These were the response to general prompts asking teachers to describe the most influential PD experiences they had. The teachers selected for the first phase however were invited because of their innovative early adoption of ICT into their practice. It was of no surprise that ICT was relevant in their PD, however they did provide grounding for *what* and *how* to ask phase two participants about digitally mediate PD resources – as the context of discovery is designed to solicit.

All of the phase 1 teachers mentioned the importance of new digital tools, but teachers held different views of ICT specifically that led me to set digitally mediated PD narratives aside. The data suggested an agreement with the literature that 'context' and 'content' were key variables in PD and digitally mediated context and content were emergent in phase 1. I added these resources to the protocol for phase two in order to see to what degree and how relevant digitally mediated resources were to expert teachers. In order to separate digitally mediated resources out, I found all narratives that included the use or mediation of PD with digital tools.

I want to single out some unique aspects of the use of ICT for PD among the early adopters interviewed in phase 1 prior to moving on. First, not all of the first round participants spoke to each resource (except in the case of use of 'New Digital Tools') showing broad variety in the use of ICT even between the smaller sample of phase 1 participants. Some had been working with these tools for years, "God bless Netscape", before coming upon innovative practices. Others felt like relative newcomers to the use of digitally mediated resources:

> "Even 6,7, years ago the access to a lot of tools we have here in school weren't available. Just the things we're doing today wouldn't have been possible given the structure of our school, access to labs, just to even have time on the computer, to do that, wouldn't have worked."

For all of these teachers there was a clear sense that 'staying current' was important, they recognized that what came easily, could be outdated just as easily. Andrew said it best,

> "What I know today might be worthless tomorrow..."

This led to a unique humility among these teachers. They often pointed to others, a network of people, or digital experiences as the source of innovation rather than express their own innovations:

> "I heard of one guy... ditch[ed] traditional grading and goes with experience points."

> "I spend a lot of time online looking for resources"
>
> "…bouncing ideas off groups at other schools across that 3 state group."

Also, even for early adopters, I was struck with how little time they reported with digitally mediated resources in powerful ways and the degree to which they had recently 'come across' the practices they were being publically recognized for the use of. All but Andrew had a transitional narrative to tell of encountering the ICT they were known for innovating with as a revelatory moment.

> "I'd say for me one of the things is the Google reader. I got into that and doing that. That just opened my world… [to] the blogs that follow..."
>
> "It blew my mind. It was a pivotal turning point in my life."
>
> "A lot of... 'ah-ha'.. moments..."

Finally, these teachers were not necessarily trying for, or deliberately striving for innovative practices. Their trajectories fit the models of internal realization or, in Andrew's case, held a predisposition for tinkering with technology. Lucas spent time playing Everquest, a Massively Multi-player Online game, not to be an expert teacher, but because he enjoyed gaming online. He talks about how he fell upon the idea to use these digital resources in the classroom and provides a special glimpse inside this process of growth in his professional life:

> "I began to play Everquest with one and then it began to grow and a growing number of students at the high school where I taught. I suppose it was during that process and partly embodied in the sense that I'm a teacher, and viewing things as a teacher and doing this while playing with these kids and interacting with students that I had some of my early connections thinking that maybe I could use this kind of technology in the classroom one day."

Digitally mediated PD was defined by the use of or mediation by digital media. Traditional in-services or informal communities were disaggregated accordingly; so similar but digitally mediated instances of 'online communities' and 'online in-services' (ideas) were given separate coding in order to see if there were differences in the perceived relevance of digitally mediated PD over current models. Looking at all the narratives provided in the context of discovery I sorted them into the following digitally mediated resources:

- Online communities – Individual or group interaction and relationships developed or maintained primarily in online social hubs, groups, guilds, or other community network.
- Online video resources – Including video banks, streaming, user generated content, online video production tools, and online student videos.
- Online information, ideas, or fact finding – Including web browsing, lesson repositories, photo sharing, wikis, blogs, or other readable content.

- Digital experiences that inspired a new way to teach or approach learning – Including simulations, training, gaming, reflection on a digital tool, or other experience had while using digital media.
- New digital tools - Where exposure or use inspired new ideas for learning.

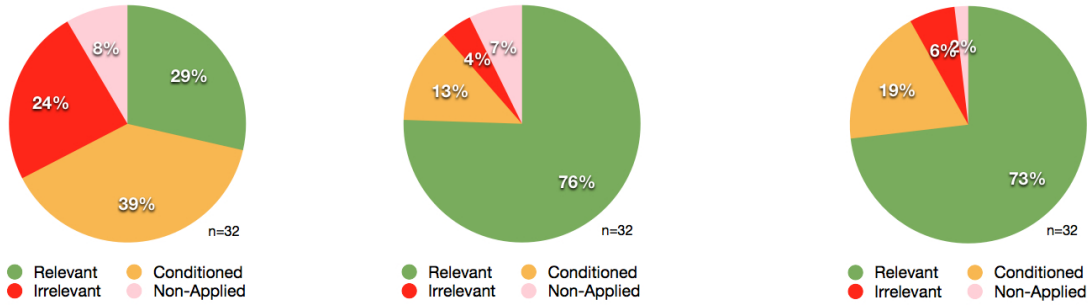
Phase 2: Context of Justification

Using these resources, I added prompts to the interview protocol for phase 2 and collected the total narratives that teachers shared regarding digital resources in their professional development. It is important to note that in phase 2, teachers were not selected for necessarily using digitally mediated PD resources or for innovative practices. Selection for phase two participants was done primarily by the various awarding agencies for teaching excellence. Teacher of the Year, the Presidential Awards, and the Profiles in Practice are all selected based on criteria that has little to do with specific use of technology. The ING and AMF awards however were given based on 'innovative' practices in science and STEM teaching – not all of these teachers however were innovating with technology. Phase 2 then provided an interesting context for justification that would see if the GLS teachers were showing glimpses of only their own unique practice of if their encounters with technology were actually precursors to a larger trend in the use of technology to access expert practice across samples.

> "I would say it's definitely, it's probably the biggest part in how I teach. I use the internet more than I use my textbooks."

In short, expert teachers were indeed seeking out and using digitally mediated PD resources to inform their practice like the early adopting teachers were. Digitally mediated resources were not mentioned as much as informalized resources, however they were almost as 'relevant' to the larger sample as a percentage. In figure 12, I add to the findings from the last chapter to illustrate how the use of digitally mediated resources shows similarity among the narratives to informal resources.

FIGURE 12: Perceived Relevance of Formal, Informal, and Digitally Mediated PD Resources

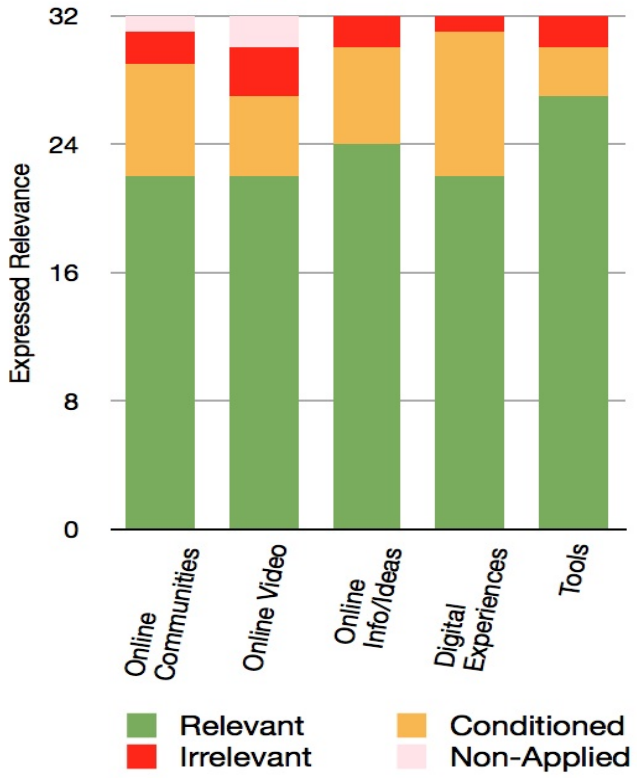


	Formal PD Resources	Informal PD Resources	Digitally Mediated Resources
Relevant	64	145	117
Conditioned	87	25	30
Irrelevant	54	8	10
Non-Applied	19	14	3
Total Narratives	224	192	160

Phase two justified the findings of phase 1; that exemplary practitioners were using digitally mediated resources to inform their practice and professional growth. As with informal resources, some teachers dismissed specific resources

as ‘irrelevant’, but all teachers found at least one of them to be centrally important to their PD. Below, Figure 13 shows relevance using the teacher as the unit of measure for phase 2.

FIGURE 13: Relevance of Digitally Mediated PD Resources per Teacher



	Online Communities	Online Video	Online Info/Ideas	Digital Experiences	Tools
Relevant	22	22	24	22	27
Conditioned	7	5	6	9	3
Irrelevant	2	3	2	1	2
Non-Applied	1	2	0	0	0
	32	32	32	32	32

Even though their awards were not necessarily for the use of ICT, teachers were well exposed to digital PD resources. In only three instances 'non-applied' was coded and in each of these the teacher leaped from the prompt to another digital resource. For instance when asked about their participation in digital communities or use of online video, teachers answered with a narrative

about a Google search or application. In other cases teachers had experienced digital resources and largely found them formative.

Teachers clearly identified these assets as relevant toward the practices that make them exemplary. For instance:

> "Who doesn't? I have correspondence with people in Australia and Sweden."

> "Yes! Yes, YouTube, TED talks, online conferences, I follow twitter feeds on conferences [I'm] unable to attend."

> "I'll admit I go to Google first...specific resources... good resources"

Teachers also found that the use of digital media not only facilitated professional growth, but the integration of it into classrooms was a topic for professional growth. The use of digital media made it both easier and efficient.

> "It was like I was there, but I wasn't... [YouTube videos], kids asked on their own, can I get the link so I can watch it again?"

> "...I got the idea from [them] and they kind of walked me through the steps. Rather then reinvent the wheel there are already some teachers who are doing great things and so a lot of the sharing has been easier not just between teachers... but strangers."

> "I don't know how I taught without it. It's an amazing tool."

The purpose of inquiry here is to find whether or not these resources were

relevant or not, and the data shows that digital media is being used both for and as a topic for PD among the nations exemplary teachers.

Summary and Discussion

ICT use, on the part of expert teachers, varied across cases and the integration of resources into their PD process and classroom practice ranged from simple use of the Internet for facts and pictures, to complete classroom transformations. I consider a full study of the use of digitally mediated resources by teachers to be a logical follow up study to this one. Where this study focuses on PD trajectories and sees digitally mediated resources as 'relevant' to growth in general, much more needs to be targeted with proper method and analysis uncovering the nature of technology use in classrooms among expert practitioners after they arrive at expert practices. A few clues to the direction of this research did arise in this data set, however, and are worth a page or two to outline.

Lets return to this data sample:

> [Online Networks] "I've been telling everybody who will listen [laughter] about something that I've been talking to others online about and this whole online thing is pretty new for me. I've just started in the last six months creating online friends and what they call a personal learning network but that's all new to me, but there are these things that are popping up around the country that I wish would come closer to us."

When I brought up technology as a PD resource, many of the phase 2 teachers expressed a similar design to be “telling everybody who will listen”. They generally found digital media to be surprisingly easy to use and wanted to tell me to tell others about their experiences. Now, the scope of this study was to only identify what and if PD resources, of all kinds, were relevant in the PD of the nation’s expert teachers to inform future research into building relevant training and PD programs for teachers at scale. However, if I left this chapter only sharing that these resources were relevant, I would be abandoning themes from teachers that they wanted heard loud and clear. What teachers reported made them ‘experts’ was 1) the growing ease of use of ICT, 2) a willingness to try new things or even ‘fail’, and 3) an open mind about ‘techies’.

Ease of Use

Teachers did not just narrate relevance and examples of PD, they added, with evangelical zeal, that I needed to frame those stories by sharing how what they did with ICT is really doable by *anyone* that will give it a chance. For instance, at the end of the interview with Joe, he stopped me and wanted to say something more:

> T: “Yeah, that was painless. If I could have one more thing that is on my mind.

I: Yes, please do.

T: One thing that is always on my mind is just the technology that is out there is getting simpler and simpler to use."

"Oh, for sure. I think as teachers embrace technology they'll actually see how their jobs could become easier."

Many teachers expressed how easy technology was to use in recent years. Three other themes about technology arose during phase two that are not part of the scope of this study but warrant mentioning for future inquiry.

'Failure'

First, some teachers expressed a unique perspective on trial and error as a component of both teacher and student learning that concurs with scientific inquiry. The use of the terms 'failure' was used *positively* in progressing on a challenge or collaborative behavior respectively.

"Yeah, I love failure. Failure is the only time I learn."

"If it doesn't work, it doesn't work. You just go back to the drawing board..."

"I brought it in and I told them I don't know much about this. We're going to learn together and it was super successful. The kids jumped right in and they taught me mostly how to use it."

The innovative awardees, early adopters, and subject specific award winners expressed a similar comfort with trial and error in their practice. Despite 'failure' or 'trail and error' being part of the interview prompts, it was introduced by the teachers in 17 of the first 22 interviews and would warrant being addressed as a practice in both pre-service and PD training.

'Techie'

The term 'techie' and identification with it was not a pre-condition for using technology – many teachers did not identify themselves as a 'techie', even when using and innovating with technology in their exemplary classrooms. The regularity of this apparent contradiction was exemplified by the following comments from teachers who found digital PD to be relevant in their practice:

> "Absolutely no, no way... I'm 52 years old. I'm still celebrating the answering machine! [laughs]"

> "I wouldn't even call myself proficient and I realize that is a weakness."

> "I'm constantly worried that I'm going to break something."

Teachers regularly admitted that they struggled with technology while at the same time using digitally mediated resources for relevant PD and integrating digital tools into classroom practices. This is relevant because teachers may be hesitant to try using new ICT resources because of a self-perception as a 'non-

techie'. Many participants shared this self-perception, but were surprised when they found it to be irrelevant with today's ICT resources (ease of use), and then wanted their colleagues to understand how irrelevant this term is for digitally mediated PD.

Exemplary teachers across trajectories of PD found various digitally mediated PD resources to be centrally important to their own professional growth. The identification of and assessment of relevance is only the beginning of the work that needs to be done to understand *how* these tools are used, to what degree they are used, and the application of their use in PD and classroom practices.

Chapter 8

> "If I had been in a different building, even within the district, it would have not had the same outcome."
>
> - Teacher

Findings: Experience of Leadership

Because leadership is central to creating context and the content of traditional PD in teaching, it is no surprise that narratives concerning leadership were a consistent pattern among the first round participants – often without prompt. In this chapter I will first explain the nature of this data and it's limitations, then show how leadership became a 'discovered' part of the study in phase 1, and finally highlight the top leadership tasks noticed by exemplary teachers. These perspectives of leadership were consistently appreciative of the context leaders established with1) a permission to innovate, and 2) the provision of resources, and the 3) allowance of time for collaborative thinking about teaching and learning.

A Teachers' Eye View

Prior to any discussion of leadership, in singling out narratives about leadership practices from exemplary teachers, I want to establish that my goal here is to represent the teacher's voice as closely as possible, not necessarily present leadership in all the complexity and nuance that it deserves. This is the teacher's perceived evaluation of leadership, not what it may or may not actually

be. To illustrate this, let's look at three of Holly's comments that pertain to leadership:

> "As a sixth grade team we work really closely together to provide differentiated experiences..."
>
> "My administration may not be happy but [laughs]..."
>
> "I think it's frustrating when they are used and they aren't relevant for a teacher...
>
> "She looks at our numbers... we don't send as many students to the high math classes and that was really important information for us to know. It's never easy to hear, but it's important to know."

Commonly, teachers would have very mixed narratives that were both about and included aspects of school leadership. Holly's narratives could praise team teaching, then reflect the context of oversight, express frustration, and admit the importance of leadership in addressing tough issues. These were at times involving a building principal, at times district level policy, and at times they incidentally talked about conditions that are established by leadership like having a "sixth grade team" to work with. These may or may not *directly* involve a principal, but the context of generative discussions of teaching and learning are the result of a choice made to team teachers. Coding such data was an unexpected difficulty in the study.

Second, this study is concerned primarily with teachers' experiences that placed them on and guided them along a trajectory of exemplary practices. Teachers usually, and practically, provide a classroom level perspective of leadership. This path of PD may include, unaware, many facets of exemplary leadership that will not appear in this chapter because either teachers did not perceive the influence of leadership in their journey or they highlighted some leadership work above others to communicate a degree of relevance in their narratives. For instance:

> "He was super supportive. Anything I needed, he would help me get as far as, of course he couldn't get me money because nobody has any money but for grants, whenever I'd ask for recommendation letters to get money for the school or for an award or things like that he was right there ready to do whatever it took..."

In this case the exemplary teacher is both praising the person they perceive as 'leader', but expressing that they are writing grants for resources. The teacher is narrating that they are serving in a leadership role (resource acquisition) without calling themselves leaders. Because they are award-winning teachers, I would hope to see many occasions where formal leaders leverage the capacity and expertise of teachers like these - reflecting distributed leadership model (Spillane, et al., 2004), but from the teacher's perspective this is narrated as "he couldn't

get me money" despite the fact that "he was right there ready to do whatever it took". In the end, this teacher did have resources, but she was given permission and provision to lead. We see signs of exemplary leadership here, but from a classroom perspective.

This same limitation presents a unique asset too – seeing leadership through the lens of expert teacher, provides a secondary way to weigh what tasks have perceived impact on teacher practices. If teachers were not inspired to share leadership stories initially or had told stories of leadership that drifted toward negative experiences, I would further probe with the question: What would ideal leadership look like to help you grow as a teacher? What advice would you give? These responses were abstracted, but helped gather what expectations and perspectives the teacher had toward leadership.

Finally, participants would at times have had *two* or more local school leaders that were part of the larger narrative of professional growth. In these cases narratives regarding the different people could be both positive and negative, comparative, or abstracted into general beliefs about leadership instead of specific narratives. For instance one teacher told two stories explaining the importance of administrative permission for practices:

> "I have been someone who's been lucky enough to be in schools and work with administrators who let me try new things out whether it was establishing blogs with schools in other parts of the country or getting kids to try communicating with students in other parts of the world..."

vs.

> "I knew that style of teaching was not well thought of by supervisors and so I think to prove your spot a little bit you have to sort of go with the flow a little more until you have that security... my job hinged on the approval of direct supervisors who only valued traditional stand and lecture class styles teaching."

In order to reflect multiple narratives, competing narratives (referring to different administrators), and many cases where a teacher shifted the topic to tell their story (thus not commenting on a leadership attribute) the findings for this chapter are reported not by teacher, but by narrative to more accurately present the nuanced perspectives of the teachers.

Here we stay close to the teachers' journey, and an admittedly unique lens, but there are clear implications for those looking at leadership practices too for those that read between the lines.

Phase 1: Context of Discovery

Traditional or Formalized Perspectives of Leadership

Often principals visit the classroom for one instructional unit and follow up with an evaluation. More recently this may also include meetings before and after to identify goals, targets for observation, and areas for professional growth. As teachers recalled their experiences toward expert practice, they were reminded

to talk about local administration, district policy, and state level policies that may have encouraged, informed, or been relevant in their PD trajectories.

The first phase of teachers did share narratives that involved leadership. They included:

- Formalized practices that were part of the district/school PD program already,
- Informal influences that were not necessarily designed or provided by the school/district,
- The allowance and encouragement of innovative practices,
- The provision of technology, and
- The opportunity to take on leadership tasks themselves.

Formalized Leadership Experiences

The first type of narrative was that which the teacher perceived to be 'what leaders did' formally within their schools. Across the larger sample these would be expanded to include providing a school 'vision', observations, walk-throughs, staff meetings, some in-service training sessions, organization of workshops, data collection, and data analysis. In the discovery phase formal leadership tasks were shared as such:

> "You have to have administrators who are willing to say this is our school..."

> "I had a visionary administrator."

> "I've always been a fan of observations whether they are peer based or administrative based. Just for that sanity check..."

> "My job hinged on the approval of direct supervisors who only valued traditional stand and lecture class styles teaching."

> "…an administrator doesn't come into my classroom…"

Teachers perceived that the role of the school leader was formally that of providing a school vision and 'observations' in various forms. The act of evaluating and "approval" of teachers was perceived as the primary function of leaders. However teachers would go on to share that they had a uniquely positive informal relationship with their local administration.

Informal Leadership Experiences

Teachers also described that beyond their formalized PD duties, leaders in their experience provided what Andrew called "a partnership". Others added:

> "I always tell people, that I can't take all the credit for being able to do innovative things because I always go through my administration…"

> "If he didn't understand it, he'd look at me and say, I'm not sure I get it but I trust you…"

> "I think this is really important even in terms of professional development is this idea of having a participatory model that's not top down."

> "[I want] a little bit more informal interaction."

These narratives represented the most challenging type to identify later, where teachers identify a relevant experience of leadership that is not part of expressed PD programming. However institutional trust, professional community, organizational learning, efficacy, and bottom-up, leadership strategies are well established in the literature (Louis, 2006; Wahlstrom & Louis, 2008) as effective leadership practices. These teachers recognized and noted the importance of these strategies, but their representation of them came abstracted in similar forms to those above.

Leadership Experience of 'Permission'

Teachers voiced this informalized leadership most often as a form of permission for their ongoing PD. Teachers expressed this as a continual, necessary, first step, for any exemplary practices. :

> "I always go through my administration and my administration is accepting of risk taking."

> "He'd look at me and say… give it a try and if it doesn't work out, tell me what you learned.' There again is that underlying principle that failure is the first step to success and it's a necessary ingredient."

> "There might be some standards in the district but the idea of how we're going to go about meeting these standards is

> going to really, teachers are going to have a lot of autonomy for that."
>
> "I have been someone who's been lucky enough to be in schools and work with administrators who let me try new things out whether it was establishing blogs with schools in other parts of the country or getting kids to try communicating with students in other parts of the world..."

Also of note is that teachers perceived that they were "lucky enough" to have leaders that allowed for innovation. They "can't take all the credit" because they see working with their leaders as "a partnership" between the teacher and the leader to conceive, implement, and assess new practices in the classroom – "a huge and empowering sort of thing". This perception of leadership was prevalent enough in the discovery phase to add as a unique protocol prompt for phase 2 asking about the importance of the 'allowance of practices'.

Leadership Experience of 'Provision'

The current development of the Comprehensive Assessment of Leadership for Learning (R. Halverson & Dikkers, in progress) dedicates an entire domain of leadership tasks to the Acquisition and Allocation of resources. Teachers in this study confirmed this as essentially relevant leadership practice for their exemplary PD -at times of primary importance:

> "The number one way that they helped us was to get funded for it..."

Also, phase 1 teachers pointed this out as a relevant barrier to their practice.

> "The other thing I would say is you need to have resources...Did I find those things in the schools I'm in from the administrators? No."

The allocation and acquisition of resources did hold some variance among the teachers but was more often a factor that the early adopting teachers felt was an asset to their trajectory of PD.

Leadership Opportunities for the Teacher

Finally, during phase 1, there was one mention of a participatory model of leadership:

> "I think this is really important even in terms of professional development is this idea of having a participatory model..."

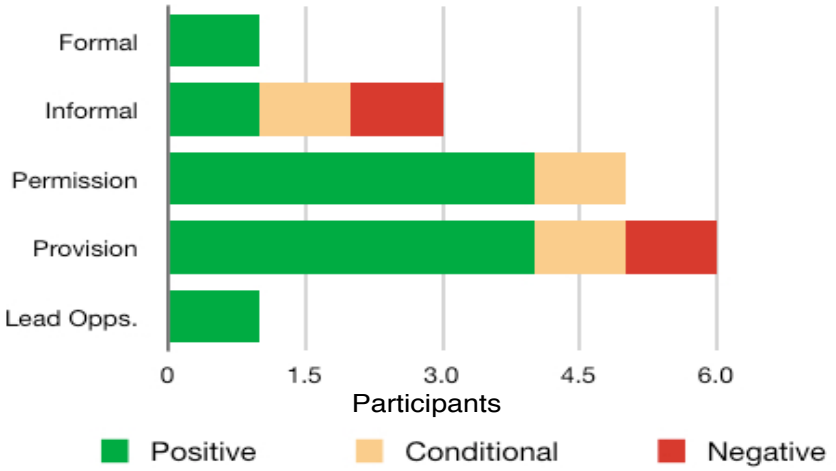
In Jim's case, the district was starting a new alternative school and invited him to participate in building the school's policies from the beginning. He found this level of engagement to be invigorating and inspirational in his practice too. So though no individual person is noted in these narratives, there is a clear leadership task of including teachers in transparent and collective decision-making. These practices have had a long tradition in leadership literature;

formerly as site-based decision making (Conley, 1991) and more currently data-based decision making often advocates for teams of educators making key decisions (Wayman, Midgley, & Springfield, 2006). This finding led to a specific question for phase 2 to justify the relevance of committee work for the teacher's perception of PD.

Discovery analysis led to five types of narratives from teachers that framed their perception of the relevance of leadership in their personal trajectories of PD. True to the influence of grounded theory on McAdams method, leadership practices and influences were not initially part of this study. Following where the data led, I pulled sixteen leadership narratives from the phase 2 discovery interviews and sorted them into narratives about what teachers perceived as formal leadership, informal leadership, permission for innovation, provision for innovation, and leadership opportunities for the teachers.

Data was coded accordingly: positive, negative, and conditional relations to the teachers' professional development to get a sense of the number of narratives and the expression of those narratives (see Figure 12). Positive and negative coding required a direct and clear affirmative or negative statement of value regarding the leadership practice, like "that was essential" or "I don't want a principal to become a resource gatherer." All of the teachers are exceptional, so this goal was to delineate between teachers that reported leadership *aiding* that trajectory or *hindering* their growth.

FIGURE 12: Relevance of Leadership Narratives – Phase One Discovery



	Formal	Informal	Permission	Provision	Lead Opps.
Positive	1	1	4	4	1
Conditional	0	1	1	1	
Negative		1		1	

The purpose of discovery was to detect the *presence* of relevant resources for PD, not necessarily the *predominance* of them. So the number of narratives was not as important here as that leadership was mentioned as relevant.

In one unique case the district provided a course that teachers had to take in order to get any classroom technology they would need for new curriculum. Because this was designed and established as part of the districts 'formal' PD, it represents the one narrative from phase 1 'formal' experiences. School leaders would teach specific content regarding innovative practices and assignments included in the redesign of a unit in class.

> "The whole goal of it is to get teachers from different buildings together talking about ways of using technology in their classrooms, bouncing ideas off one another, having discussions about the values of it... I took that class twice."

In the conditional and negative accounts, teachers wanted more relevant guidance in their own experience, but had not seen it. Jim's story of regarding leadership opportunities was also a singular narrative that defined inquiry in phase two.

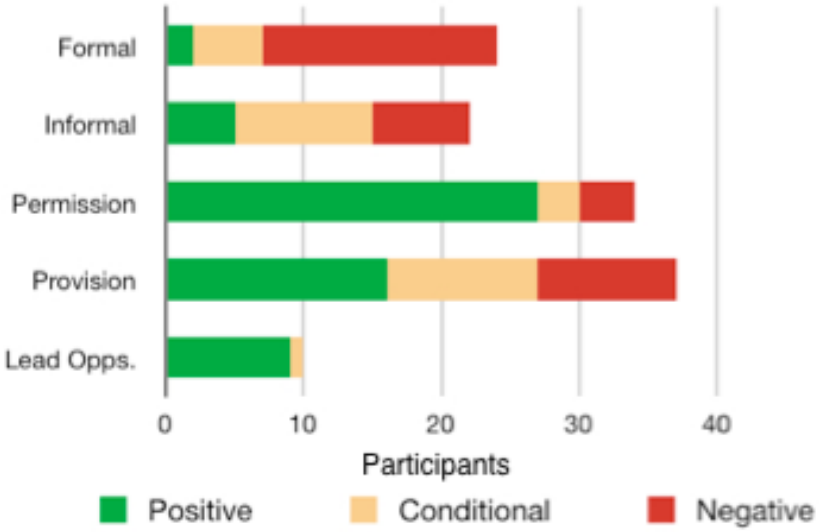
Permission and provision were the two most commonly reported assets of school leaders. These narratives were clearly relevant to the teacher's professional development trajectory as noted above and suggested that they would also be considered relevant in the larger phase two sample. Four prompts were added to the protocol involving leadership 1) formal or informal guidance, 2) allowance for new practice, 3) provision of technology, and 4) work for the school. or district.

Phase 2: Context of Justification

The five types of relevant leadership practice were all confirmed in the context of justification, yet not necessarily as positively perceived. When asked about the influence of leadership practices, responses showed a preference for the permission and provision leaders provided as expected; both formal and informal school level tasks were perceived conditionally or negatively; and 9 of

the 10 narratives concerning leadership opportunities were perceived as relevant in the teachers PD trajectory.

FIGURE 13: Leadership Narratives – Phase Two Justification



	Formal	Informal	Permission	Provision	Lead Opps.
Positive	2	5	27	16	9
Conditional	5	10	3	11	1
Negative	17	7	4	10	0

Though asked directly about the impact of leadership practices, teachers still mentioned them spontaneously when talking about their PD in general – as they did in the discovery phase. Narratives about leadership were then interspersed throughout the interview transcripts. These were sorted and added to the data. Totals do not necessarily equal 39 because the teachers were allowed to frame the value (or frustration) of leadership on their own terms and would often mention some, but not all, of the leadership practices coded.

Justification of Experience of Formalized Leadership Tasks

The participants collectively rejected formal practices, those formalized by the district as 'required' PD for teachers, as relevant to their own professional development in the previous chapters. Teachers primarily perceived the district/building contribution to PD primarily in terms of the traditional classroom observation – a formal process mandated by their contracts.

Only 2 of the 39 teachers called themselves a "fan of" or that the observation process was "essential" to their practice. Teachers had strong opinions on this point and few of them had conditioned narratives, instead they would contrast multiple leadership styles in these cases comparing effective and ineffective principal contributions. 17 of the 24 narratives stated that formal observation and PD from principals was not relevant to their own PD trajectories. Many were emphatically stated:

> "I think it's frustrating when they are used and they aren't relevant for a teacher..."

> "Absolutely not." or "Not at all."

> "I would say not very relevant. I'm sorry, but do you need a reason?"

The answer is ‘No’. For this study, if it wasn’t relevant to the teacher, I did not ask for reasons. Yet teachers at times wanted to clarify why they targeted classroom observations:

> “It makes me more nervous than anything else to have my administrator, especially when I know what they are looking for because I tend to teach to what I know they are looking for as opposed to just teaching.”

> “Those are not helpful... Frankly, lets jump through hoops. That's not going to help me.”

Top-down, formal, PD activities were largely not relevant to expert practitioners in informing their professional trajectories of practice.

Justification of the Experience of Informalized Leadership Tasks

Informal leadership was presented with no clear consistency across the teachers, perhaps because informal leadership was coded as leadership tasks that were not part of what the teachers perceived as ‘required’ PD activities (see phase 1), but were clearly coming from leaders in the building. There was a relative distribution between positive (n=5), conditioned (n=10), and negative (n=7) narratives as teachers sought to clearly define what did and did not work for them. In conditioned responses they often leaned toward self-directed learning:

> "I guess more informal guidance is better for me. I don't want to be told but if I see something that looks cool, I'll go out and try it."

> "Sometimes they do and other times they just railroad in what they want us to know..."

Some also noted that informal PD was conditioned by its topic or source:

> "Having professional development around technology integration and that's something I see a great need for..."
> "Primarily, some administrators actually offer tidbits that are helpful and most administrators don't."

Teachers understood informal instructional leadership in a range of ways including talking in the hallway, offering "tid-bits", data-driven decision making, and creating a "culture of instructional leader".

> "We'd sit and brainstorm and think through it and that feedback was incredible... It was really informal and casual and sometimes the conversations were in the hallway and sometimes the conversations were in the lunchroom with kids. To me, those informal moments matter more than the big formal ones."

> "Primarily, some administrators actually offer tidbits that are helpful and most administrators don't."

Negative examples spoke of "railroading", "throwing something", agendas "to improve the test scores", and simply the lack of a relationship with the school

leader that had relevant impact on practice. Top-down leadership practices were consistently not welcomed by expert teachers and teachers were sensitive to efforts that looked collaborative, but came with 'hoops':

> "Yes, but... PLC's will be planned by administrators and mandated... I think it indicates a real lack of trust of teachers as professionals. Those are not helpful... Frankly, lets jump through hoops. That's not going to help me."

Conditional statements were generally differentiated between these two leadership styles, top-down and bottom-up, while teachers consistently expressed a desire for more of a positive influence from their principals.

> "I want an administrator who knows more than I do..."

> "I don't want to be told but if I see something that looks cool, I'll go out and try it."

Teachers did want and valued strong instructional leadership in both formal and informal programming within their schools. Conditioning of relevance was in terms of experiencing a variety of people in leadership roles, and topics that were relevant or not to the teacher.

Justification of Permission

Exemplary practitioners reported the primary role of leadership in their professional development was to provide permission for new innovations. 27 of the 38 teachers unconditionally named permission as essentially relevant for their

PD and trajectory to award winning practice. At first blush, looking at only the tally, this sounds a bit like a 5-year old that wants permission to do whatever they please. One teacher *did* express a wish that leaders "could leave me alone so I could do my job"; however this was not at all indicative of the larger sample. A qualitative review of the narratives shows that permission from leaders was appreciated in a much more positive and appreciative light. Teachers saw permission as more of a leadership act than allowance.

> "I would say extremely, extremely important. One of the most important factors is the administration."

> "Supported in a way where they are excited about it and interested in it."

> "He was super supportive... he trusted me that he let me go off on my little tangents because it produced results..."

Permission for these teachers demonstrated a form of vision on the part of the leader to overlook and actively support teacher initiatives. Teachers wanted to know that even if they failed their local leadership would still see them as competent teachers. Permission was an act of trust.

> "Number one [he] values what I do and trusts that I can teach 100% because he's allowing me to do it."

> "I would tell you from both perspectives, they've trusted me and listened for my input..."

Teachers saw permission as an option for their local leaders. There was a respect for the supervisory role that they played. These teachers wanted to work with leaders rather than in perceived conflict – this was 'huge'.

> "He was willing to support us. The influence of administrators has been pretty huge in my life... Yeah, definitely. I've had good experiences with administrators."

In cases where teachers felt their local leaders weren't supportive they either changed their practices to what they felt was approved to comply, or they chose to practice 'with closed doors', but this was never perceived.

> "I knew that style of teaching was not well thought of by supervisors and so I think to prove your spot a little bit you have to sort of go with the flow a little more until you have that security..."

> "Um, I did it but I did it with closed doors because it wasn't the standard."

This was never the preferred state. Unlike a 5-year old wanting their way, these teachers did not *need* to have permission; they sought it out because the wanted it as a professional support and collegial asset in their professional development trajectories. In cases where teachers had had multiple principals, this factor of permission was what defined the differences between teacher perception of good leadership or bad.

Finally, teachers often *went out of their way* to make sure I knew how "lucky", "important", and "fortunate" it was to have a principal that supported and encouraged new practices. They understood this attribute to be a rare and valuable leadership asset. Given the push for standardized content, curriculum, and practice, this willingness to allow innovation was pointed out as paramount.

> "I just need to mention the principals willingness to go along is not to be underestimated... Well, obviously, it's paramount. It's essential matter."

> "I can't take all the credit for being able to do innovative things because I always go through my administration and my administration is accepting of risk taking. That's a huge and empowering sort of thing."

27 narratives were shared that concurred that this sort of active permission was the most important PD resource that leaders could provide.

> "I think the most relevant from the administrator is the support of innovation - the principal that allows for trying new things and do new things. I have been fortunate…"

Justification of Provision

Provision of resources for teachers was mentioned more often than permission (37 times), however only 16 narratives expressed provision as a positive component of their professional development experience. The range of what teachers perceived resources to be included:

- The allocation of time,
- Access to fellow professionals,
- Money for conferences, workshops, and training,
- New ICT and training to use it,
- Reading material and grant applications and,
- Money for supplies

The experience of provision accounted for the most conditional responses and ten negative responses. These teachers wanted to clarify that resources, especially technology, was not what they needed, though it was helpful. They appreciated the help of course, but were willing to seek out and access their own resources through their own money, grants, community relationships, and students bringing in their own technology.

> "I've written lots of grants for equipment..."

More often, teachers saw the need for leaders to provide PD time surrounding the resources provided. This was a common theme among the conditioned and negative responses:

> "There is no opportunity or very little opportunity within the school system to actually get the professional development you need."

> "That's the problem. Just because you have the technology doesn't mean you know how to utilize it to the best advantage..."

> "We keep purchasing all this technology but we don't ever provide teachers with training or resources on how to use this..."

This common narrative may explain the positive relevance of informal and digitally mediated resources in the previous chapters. When teachers do not see the PD they are seeking locally, they may be reaching out to PD resources outside of the professional setting; but is this the preferred state? In cases where this technology training was available (in or out of school), teachers use it and narrate its importance in their expert practice:

> "Because the district was able to facilitate early training for me that I felt comfortable taking those risks in moving technology into the classroom."

> "Giving you the opportunities... let you go out and have staff development..."

Provision was perceived in terms of frustration too. Teachers that perceived a lack of resources expressed a concern about PD for tools or 'drop-in' technology as a problem in leadership.

> "We have lots of wonderful technology in our building. We don't have the support to make sure that it is always working correctly which is a big frustration.

> "My science budget here, Seann, is half what it was when I started 33 years ago... I supplement a lot with my own salary."

Though provision of a variety of resources is welcomed, the lack of resources was presented as a frustration. Because these were exemplary practitioners, lack of resources was not an insurmountable barrier, nor did the teachers stop their PD trajectories when faced with it, but they shared a desire for leadership to attend to this to smooth the process along. Again, this was not a cry for getting what they wanted, because they reported doing so on their own, only that this could make professional growth easier and they appreciated leaders that made it happen with intention and provided PD along with time, technology, programming, and supplies.

Justification of the Experience of *Leadership Opportunities*

Though unsolicited by the protocol, 10 of the 39 (24%) teachers expressed that opportunities to share, lead, or participate in decision making was relevant in their PD trajectory of *classroom* practice. The chance to present was presented as a cumulative learning activity that helped teachers organize thoughts, build networks of colleagues, and helped build a respect for the leader that opened doors for the other practices listed above. Leadership opportunities were 'really important' to the exemplary teachers that had experienced them:

> "I think this is really important even in terms of professional development is this idea of having a participatory model that's not top down"

> "One of the teachers I work with, she is nervous and new and she knows she needs to change and so something that my administrator has done is she's let me go in and work with her kids. My principal has come in and covered my classroom..."

> "I think they have to have a buy in and a belief, a true belief, in shared leadership. I think the more shared leadership goes on in a school, the stronger that the principal actually becomes..."

These teachers mentioned these in the context of personal growth and transformative practices in the classroom. Because this was an incidental finding upon sorting the narratives, there is a possibility that many of the other teachers were influenced by this kind of leadership, but it did not come to mind during the interviews.

Summary and Preliminary Discussion

Leadership and leadership practices were essentially relevant to the teachers in this study. 33 of 39 teachers claimed that school leadership was essential to their PD or provided key components of their trajectory of learning. This data concurs with the literature expressing the importance of leadership for expert practice and growth. All teachers noted at least one of the five themes as 'relevant' for their PD trajectories.

Those teachers that did not have strong leadership influence on their practice still maintained a clear vision and hope for leadership that was

supportive, trusting, and provided for informal guidance toward expert practices and leadership opportunities in decision making and sharing practices with others. Negative narratives were mostly the desire for stronger leadership in terms of instructional leadership and resource acquisition and allocation. In these cases the lack of leadership was a barrier that they overcame with recognition that their trajectory of PD would have been aided by effective leadership practices.

Classroom observations and reviews of practice were perceived as conditionally or entirely irrelevant, to PD, to all but two teachers in this study. In conditional cases, teachers had experienced different leaders that treated the evaluation process differently. Principals that shared clear building or classroom needs (often using data) were perceived as more relevant than those that did not. Because this was an expert sample of teachers, the relevance of observations can be accounted for as more important for novice teachers with diminishing returns later in the teacher's career.

> "More relevant when I was a newer teacher... As is, they aren't very helpful..."

In other instances (i.e. provision) teachers conditioned responses saying they appreciated efforts. Across this data, there were few conditioned responses of this sort and teacher's classroom observations are a requirement of many contracts, but should not necessarily be considered as relevant PD.

The consistent picture of expert practice in this study was a school leader that allowed permission for trial and error despite pressure for consistency and standards-based test preparation. Leaders that recognized innovation and gave allowance for it were able to create the conditions for award winning practices. Again, this chapter was not a review of leadership, but only of the perception of leadership by expert teachers, or those aspects of leadership that were noted by the sample set.

Secondly, many teachers reported the importance of encouragement and enthusiasm on the part of the school leader. In these cases, this was primarily done through informal relationships:

> "I guess more informal guidance is better for me. I don't want to be told but if I see something that looks cool, I'll go out and try it."

> "He came to my classroom and he was like, 'hey, it's the 50th year, we've got to do something. Put it in your think tank and let me know your thoughts.' He's always willing to coordinate and brainstorm."

> "I believe an administrator, a principal in particular, has to know his teachers and be that lead learner and build that positive culture that we can work together and I think what it really all gets back to is that a principal has got to believe."

Leaders in these cases intentionally visited the teacher often, sought them out for input, knew what was happening in the classroom, and consistently expressed allegiance with the teacher's efforts. These findings mirror closely those found by

Wahlstrom (2008) showing how teachers experience principal leadership in the forms of trust, efficacy, and shared responsibility for PD.

Technology, and other resource allocation, was welcomed of course, but not a necessary condition for expert practice. Teachers that were not provided technology often spent their own money, used private resources, sought grants, or worked within the district to use unwanted, older technology. More importantly, teachers reported that when resources were allocated, relevant and timely PD should accompany it so that they can easily learn more about new resources and apply them.

Leadership was presented as an essential aspect of the trajectories of PD that expert teachers were expressing. Leadership mattered. Every teacher in the study highlighted at least one of the five types of narratives as being unconditionally relevant for their practice. More than just asking leaders to permit and provide, teachers asserted that these were intentional and appreciated tasks that a leader could provide to speed PD and aid in the acquisition of new skills. Teachers that had these tasks present expressed their centrality to their growth and the value they placed on their leaders as co-professionals in their PD journeys.

Chapter 9

Discussion and Summary

This study profiled 39 national award-winning teachers, and collected their narratives for how they acquired the skills they were recognized for. If there is a need for highly qualified teachers, and those teachers are practicing in a time of changing ICT, these participants represent those that have successfully navigated the very challenging waters of PD. Their narratives collectively provide a glimpse into PD practices that warrant the attention of all who are trying to train and support expert practices in the classroom by showing how teachers are accessing the PD they need, what resources are relevant to exemplary practitioners, and defining the types of trajectories exemplary teachers are traveling on toward expert practice.

Participating teachers revealed a collection of PD resources that were relevant to their own trajectories. These resources included, but were not limited to those intentionally designed and presented by their local district. Teachers shared that they found central relevance in PD that came from interests outside of education, interest-based communities, digital tool use, digitally mediated experiences and communities, and their students. Finally, teachers expressed the central relevance of local leadership for support, permission, provision, and providing opportunities to meet with other teachers, go to external PD sessions,

and chances to share their expertise in a leadership role. Expert PD is currently accessing PD resources that are not expected.

Lessons from the narratives of award-winning teachers:

1) Tend to come from non-traditional certification programming or claim their ideas came from training in another profession.
2) Have a roughly equal chance of an existing predisposition that guides their PD seeking or a transformative experience.
3) Tend to seek PD in informal settings,
4) Tend to seek out digitally mediated PD, ideas, and communities,
5) Tend to rely on or want strong leadership for innovation expressed first in permission and provision, but reinforced by well-executed opportunities for PD and collaboration on innovative design.
5) Held effective leadership practice as conditional, or at least generative, for innovative practice to occur.

During discussion, I will first review some of the challenges for a study like this. Then I will discuss what the data suggests schools and school leaders should do to get more expert practitioners in their settings. Finally, I will review what research directions should be taken to further advance our understanding of how to train and support expert practitioners.

Challenges

Expert bias, scalability of findings, and binary narratives are considerations for the use of this data, however, I argue that when considered inside a community of researchers, they are minimal obstacles, then I will briefly discuss the variance of trajectory paths and how that conditions application of the data.

Expert Bias

Expert bias and the representative size of the sample could be considered limiting for the study. This study is not meant to generalize the teaching profession overall; it only clarifies what *expert* practitioners are doing. One critique of preliminary findings, received online, was that the purpose of mainstream teacher education is not to train expert teachers but to mass-produce teachers with a modicum of competence:

> "Traditional 4 year programs don't try to prepare these types of outliers… but rather they prepare the middle 50%. They are hoping for a small standard deviation on talent."(Etheridge, 2012)

Etheridge argues that exemplary samples do not inform mainstream practice. I disagree with this premise on the grounds that the goal of *all* training and development should be to pursue excellence in practice at *all* levels by providing a model of expertise that can be a target of developmental trajectories

over time. These are not just “outliers”, these are 42% of the best teachers in the country.

In order to point teachers toward expert practice, it is essential that a model of practice be first established. In this case, the *path* to expertise is in flux and this data serves a key role in identifying PD resources, systems, and design that can be brought to a larger community of teachers with far greater effectiveness. I question why anyone would seek, accept, or tolerate a sub-standard model of training when data shows more effective models are possible.

It is worth noting the degree to which teachers considered themselves as converts from what they considered mainstream ‘teaching-to-the-test’ or how they were trained. Many of these teachers considered themselves disappointments before they changed practice – they did not start practice as an “outlier” at all. The mid-career changes of trajectory imply that PD at scale, or changed practice, is indeed a welcomed event for nearly half of our award-winning teachers. They expressed a humility and willingness to adopt, integrate, and innovate because they recognized a better way to teach – once they were aware there *was* a better way. I argue that the sample set used here was not selected to represent all PD trajectories, but only trajectories that proved effective. What if there were many teachers, like these that are ready to see a better path toward expert practice, and when shown they, like these teachers, transform their practice?

Scalability

Scalability then is a secondary point of interest for this study. To what degree can unique, and highly personalized, PD trajectories be designed for PD at scale? Relevant PD resources were largely informal and implemented at will or just-in-time for teachers seeking new practices. Encouragement of informal learning is not new; others have invented ways to encourage rather than tell, lure rather than push, and to provide rich learning environments for interest rather than in-service. Though outside the scope of this study, examination of libraries, museums, park systems and other informal learning spaces could provide expertise in how to build relevant PD experiences for teachers at scale.

The question of scalability is laden with the premise that PD is necessarily driven from the top-down. To ask if PD can be applied at scale requires that PD should be delivered at scale. The interests of those responsible for teacher PD cannot be denied - nor should they. I would respond with two considerations: First, there are some relevant resources that teachers identified above that are easily scalable simply by providing access (more below); second, the value of encouragement and having leaders to "bounce ideas" off of was singled out as a "central" resource for many of these teachers. Individual PD was amplified in the data by providing the non-individualized resource of leaders that could share and counsel innovative practices in progress.

Binary Representations

Binary representations of ‘relevance’ or ‘irrelevance’ were captured in this study and validated using McAdams’ life-narrative analysis process. This allowed me to collect a large number of data points regarding what the teachers defined as a full set of PD resources. Where this provided foundational data, it did not provide the kind of nuance or detail to resources that would be a logical next step for the research. By knowing what practices are or are not relevant we gain direction, but not necessarily understanding of those practices.

For instance, ‘Drop-in’ technology, though it has not shown clear results in the literature, was consistently labeled as ‘relevant’ in the data. Teachers wanted more PD, but still used the technology by seeking alternative PD resources. What resources worked best in these situations departed enough from the prompts, that the data lacks the full story. Much more needs to be known about *how* each instrument is used in practice, what role it plays, and the degree to which the conditions of a PD resource affect its usefulness.

When dealing with emergent topics, like trajectories of PD during great changes in ICT, binary research or foundational work is essential for building a body of research that can provide theory and answers rooted in successful practices. For instance, knowing that 27 of 38 award-winning teachers were training in alternative programs or outside of education is not a complex piece of data but allows us to ask questions about alternative programming that we may have missed and to look more carefully at what constitutes expert practice in other professions that has carried over for those teachers. A follow-up study with

just that portion of the participants will give us a better understanding of exactly what was of worth for PD from alternative settings. This study works to clarify relevant targets of study more so than claim a complete understanding of those targets.

Summary of Effective Trajectories of Practice

There was no single trajectory of PD that represented all expert teachers. Often researchers make an effort to define what teachers 'need' for PD. Research has framed teachers as receivers of PD (Desimone, 2011), or in need of a 'dissatisfaction' with their own beliefs and practices (Posner, Strike, Hewson, & Gertzog, 1982), or even as 'tinkerers' (Huberman, 1993). These may have seemed to be contradictory work, and each claims a 'best' understanding of PD. My data includes elements of all of these trajectories of learning for different teachers. Instead of a single trajectory this data points to four different and distinct trajectories that would be best facilitated by a variety of PD strategies.

- Positive Predisposition – Teacher had an expert model of practice in mind that filtered their perception of PD and what skills they worked for. They wanted to be X.
- Progressive Predisposition - Teacher had a contrary model of practice in mind that filtered their perception of PD and what skills they worked for. They did *not* want to be X.

- External Realization – Teacher was already practicing as trained and encountered a new tool or approach they preferred or they were convinced would provide better results. They wanted to try new X.
- Internal Realization – Teacher was already practicing as trained and encountered a failure of practice that was unacceptable. They wanted to try anything but old X.

If teachers have different trajectories of learning, then there is no 'best' form of PD delivery unless it begins with recognition of variance in teacher learning based on PD preferences and the developmental needs. Further, in chapter six and seven, the specific resources of PD leaned away from the way schools have traditionally delivered PD in packaged curriculum, packaged in-service training, and principal observation. This is not to say that these can't be valuable resources, the data also suggests there may be more consistent ways and means to expend limited resources of time and money that would have a greater impact on actual improvement in teaching and learning – or to be more relevant to more teachers in more ways.

Teachers tended to construct ICT as a resource or the means to a resource mediated by digital resources. Briefly considering their social construction of technology can inform future design of PD resources (see SCOT

on page 29). In the literature review, I surveyed the multiple claims that ICT was being 'resisted' by teachers. This study did not confirm these findings. On the contrary, exposure to and willingness to experiment with and/or fail with new technology was welcomed by teachers in this study, especially in regard to ICT (pg 138). Even those that defined a particular resource as 'irrelevant' for their PD, often would follow up that they knew they should get around to using it eventually. Their social construction of technology was consistently positive, relevant, and a desired tool for PD, lesson design, and communication with other professionals.

Data pointed *less* to content and context and *more* toward motivation and beliefs that would align better with this data. Teachers clarified they were looking for inspiring ideas they could try and modify on their own. For instance, relevant school leader tasks included the introduction of potential ideas, permission to try new ideas, and willingness to support efforts even when they do not go as well as planned. School leaders that review and respond to teacher perception of their practices would also be better informed to spend time on tasks that had a more powerful impact on practices than formal observation of a single lesson. Promising work for formative leadership practice (R. Halverson, 2010), like the CALL survey, provides school leaders teacher perspectives on practice that can help them target and reshape their own work to best impact context, motivation, belief, and ultimately student learning. Moreover this kind of data over time can allow local practitioners to test and measure new designs for PD delivery they are

considering based on the relevant resources for PD reported on by teachers in this study.

Relevant Resources for Professional Development

The purpose of this study was to uncover emergent *positive* resources that are relevant to exemplary practitioners. The process of discovery and justification both revealed a set of relevant PD resources and confirmed that they were not aberrations in the initial sample. The findings in this study lead us to asking more targeted questions about each of the resources participants noted were relevant, especially because these relevant assets were mostly unequivocal; in their words, ‘essential’, ‘absolutely important’, ‘very useful’, and ‘the most important’ part of how they taught. We would be remiss to dismiss these resources.

Among expert practitioners, conclusive preferences for informal professional discourse, digitally mediated PD, and support from the principal were evidenced. Trajectories of PD among expert practitioners included access and use resources they defined as relevant. But what does this mean locally? How can school leaders use this data to make decisions regarding PD? Which of these findings lends itself to integration into a PD program.

Below are the resources that were collectively considered relevant in the overall trajectory of PD toward exemplary practice. Items left off the list, but may be part of current PD design, were not perceived as valuable by expert teachers. In the following list I’ll add conditions, explanations, and refined definitions that

were clarified by teachers in their narratives and gather the reasons why teachers reported these as the most relevant in their PD. I am refraining from using direct data samples here, but aim to successfully summarize the teacher perspective, from the preceding chapters.

I divide the resources the same as in chapter six. Formalized resources are those that teachers felt were already part of their schools formal programming, informal resources are those teachers felt they accessed on their own, and digitally mediated resources (from chapter seven) are emergent PD made available through the use of digital technologies. For each resource identified in the study, I provide deductions for how school leaders can potentially maximize these resources at the local level. These are not findings, but starting points for discussion regarding how schools and school leaders can best leverage relevant PD resources toward expert practice. The follow resources were identified by teachers as unconditionally relevant *across* all four trajectory types:

Formalized Resources:

- *Workshops and Conferences*: Teachers conditioned workshops and conferences based on their ability to select their own topics that were relevant to there own PD goals. When they could choose relevant conferences and workshops, these provided ideas, encouragement, networks of like-minded educators, and skills for classroom application of new ICT. Teachers valued the time to focus on practice, discuss ideas,

and flesh out ideas for the classroom. Some extended summer workshops (like the NASA program) were reported as essential starting points for transformed practices in the classroom. Teachers were excited to share how influential these experiences were and what they learned.

Leadership suggestions: Ensure available resources and opportunities for extended workshop and conferences for teachers. Expert teachers did not appreciate forced attendance, but did welcome the chance to reflect and talk about sessions they attended with school leaders and colleagues. Potentially consider having teachers request PD and explain what they hope to gain from the experience and upon return have teachers share what they learned or ideas for classroom application to other interested teachers.

- *Local, informal, access to colleagues seeking PD* – Teacher-to-teacher PD has recently been designed formally as a 'professional learning community' and built into school programming using the schedule to allow structured time for teachers to discuss teaching and learning. Teachers in this study emphasized that this time could be valuable, but was conditioned on teacher participation and the degree to which motivated teachers controlled the agenda. They emphasized that their access to teachers during passing times, after-school, and other interstitial times was "essential" for their processing of innovative ideas. One teacher worked to create this time for him and the other "tech junkies" as an informal time for interested teachers.

  Leadership suggestions: Ensure that teachers in the building have time set aside and regularly available for discussions of teaching and learning.

Encourage informal groups of committed teachers and respond to needs they may have. Resist the urge to manage this time with overly controlling directives, but maintain expectations that the time is being used well. One "tech junky" was the assistant principal, who gave up his lunchtime and worked alongside teachers on sorting out new resources for the class. The teachers valued the expertise, tacit encouragement or support, and value that leaders added by attending and being active members in these discussions.

- *Course work* – Especially in cases where teachers did not claim a positive predisposition, the importance of continuing studies was mentioned as either providing their first model for innovative practices, or teachers used the extended time to produce lesson plans, curriculum, or reflect on new pedagogical approaches. Teachers reported course work that was valuable both within and at times outside of their subject area. Course work was narrated most often when teachers were describing their starting points for new trajectories of practice. Most formalized PD programs already allow for teachers to take courses and receive compensation in the form of higher pay. Not all the teachers in this study that took such courses experienced transformed practices, however the ones that did found continuing study to be a central change agent in their trajectory.

  Leadership suggestions: Design models of PD that connect course work experience with local discussions. Consider having teachers share course work, topics, and products they are using as a result of the course. Become familiar with the degree to which teachers perceive value in the various programs and make recommendations known to teachers yet considering course work to encourage enrollment in potent courses. Work

with teachers that may be trying out new practices for the first time and ensure they perceive your permission, support, and willingness to find resources for improved teaching and learning efforts. Provide instructional leadership that defines and identifies effective and ineffective practices. Finally, in the case of Kim and Jason, their district had designed and gave ongoing credit for an in-house technology course. Teachers that took the course could then submit unit plans and request any new tools they needed. The introduction of new technology was not "dropped-in" it was strategically placed in rooms where innovative teaching was in process and provided incentive for a growing number of teachers imagining new practices.

Informal Resources

- *Hobbies* – Hobbies can inspire ideas, participation in a community, and provide opportunities to balance or 'round' out life experience. More important, the deep learning and passion required for expertise in a hobby area was easily brought back to the classroom by teachers in this study. In Lucas' case, the idea to use online gaming came while quizzing students while playing Everquest. Allen chose to build his own aviation simulator for fun, before bringing it to school. Most teachers reported that learning hobbies were relevant contributors to their award-winning practices and their expertise in self-selected interest areas were welcomed additions to classroom practices.

  Leadership suggestions: There is a great danger in trying to formalize hobbies into a district PD program agenda. Teachers' free time would not remain such if any efforts were made as a top-down approach. School leaders can however open lines of communication about hobbies just by

spending time getting to know staff interests, passions, and pursuits. Showing interest at this level opens the door for leaders to suggest integration into teaching and learning in the classroom when appropriate. Hobbies can also be built into the school schedule in some cases. For instance, 'middle school' exploratory classes already use teacher interests as a starting point for curriculum in short extra-curricular courses or interest-based advisory periods that connect teachers with students that are learning similar hobbies.

- *At-home experimentation* – Teachers shared that many of the innovative practices and use of ICT in the classroom was prefaced with attempts to use ideas and tools at home. Teachers were at times introduced to new tools by family members or given tutorial help. At-home time with new resources was framed as separate from 'work' time and these teachers reported an internal motivation for such PD. Teachers did not appreciate when school leaders sent work home, expected work at home, or expected teachers to pay for their own supplies.

  Leadership suggestions: As with hobbies, a top-down approach to 'encouraging' at-home PD mistakes passionate teaching with willingness to extend work beyond their contract time. Even by expert teachers, formalized PD that required teacher non-contracted time would not necessarily be welcomed. Leaders were involved, however, with *suggesting* a new website, *borrowing* software, and *asking* teachers advice on new technology. Making new technology available (even as a check-out) invited interested teachers to take things home and enjoy 'playing' with technology. Follow-up conversations would allow for rich conversations around teaching and learning, ICT, and PD itself.

- *In-class experimentation* – Expert teachers did not always try practices and experience success. In most cases, the first efforts were not successful in the eyes of the teacher. Andrew reported that he "crashed and burned real bad" and then laughed about it. He was typically resilient to trying new things in class and reported how important this was for his expert practice. Teachers did express awareness that they ultimately could try things when their classroom doors were shut whether school leaders supported experimentation or not. Expert teachers found a way to try out new ideas. This may not be the case with the larger population. Though there were some narratives where teachers practiced despite school leaders, most did not. Most of the teachers in this study found their school leader to be supportive and interested in their experimentation, encouraging in failed attempts, and insulating for new ideas.

  Leadership suggestions: School leader narratives went hand-in-hand with experimentation narratives. Like Allen, many teachers pointed out how they could not have done what they did without a supportive and insulating school leader that not only permitted, but showed interest and delight in new ideas. On this resource, teachers most often stopped to talk about a type of partnership with their leaders defined in chapter eight. School leaders should seek out wants to let teachers know that intelligent experimentation is welcomed, expected even, and that results should be measured by student interest, motivation, and learning. Providing clear frameworks around new practice gives teachers a comfort to try new things without fear and facilitates interesting discussions around events and successes that do emerge. Leaders can also consider creating ways

for teachers to share their efforts, lessons, and successes with each other, but only if they have teachers trying new things in class.

- *Direction from students* – Teachers reported that when looking for new ideas, ongoing improvement in their teaching practice, and the use of digital tools, students were an extremely relevant, and potent tool for their growth. Tanya used "Monday meetings" to structure student feedback and suggestions for her teaching. Some teachers used surveys, but most described filtering all of their practice through their reading of interest, engagement, and motivation to 'dig in' to a project with rigor and passion. These teachers kept practices that produced fruit, and they pruned practices that did not. For teachers with a *progressive predisposition,* this measure was their compass for what and how they would teach – or it *was* their trajectory. They defined all of their practices not by a model of expertise, but by whether or not their practice got positive results. Students were also narrated as coming in with new ideas and tools, being excited and attracting the attention of the teacher, and responding to in-class experimentation. Student input, in these cases, went on issues of rigorous teaching and learning; students were encouraged to assume the learning would require effort, and to focus on improved practices. Most teachers found students to be relevant to their PD in one of these ways.

  Leadership suggestions: School leaders can model the importance of student feedback by seeking it out themselves. Student voice and input can be transparently integrated into many aspects of school life; showing teachers that responding *with* student suggestions has advantages over responding *to* student disengagement. Also, during conversations with teachers, school leaders can easily begin to ask, "How did your students

respond?" or "Have you just asked the class?" both modeling and giving 'permission' to seek student feedback on lesson design, projects, assessments, and other aspects of practice. In addition, teachers may make use of sample surveys, ideas for efficient weekly feedback, and take advantage of opportunities to share these methods with each other or the school leader.

Digitally Mediated Resources

The use of digitally mediated resources was notably defined as relevant to the trajectories of exemplary teachers. The award-winning practices were being informed and inspired by resources that teachers were accessing using digital tools and resources. The ways in which teachers suggested these can be amplified by school leaders is fairly similar so I will discuss these suggestions together after listing them:

- *Online communities* – Teachers reported being involved with other teachers online in addition to appreciating their local colleagues. The value of the online communities came from being able to connect with teachers at similar stages of growth and/or similar teaching assignments. Often teachers may be alone or one of only a handful of teachers with the same assignment and concerns – even in larger schools. Teachers found new ideas, encouragement, and even mentorship via involvement in online communities. I will also note that these communities were potentially hobby based or rooted within entertainment spaces. Peggy's time in Second Life was recreational, but her community within the digital world was made up of educators and those interested in teaching and learning.

- Online video resources - Online videos are readily available with a simple search prompt. Teachers reported using these for classroom supplements, for researching topics they needed to teach, getting ideas for how to teach a topic, and producing their own videos for student use. Teachers are finding better and better resources and communicating locations like TED Talks, Kahn Academy, TeacherTube, YouTube, or Commoncraft; all of which are working their way into classroom use or teacher preparation for classes.

- Online information access – Like videos, exemplary teachers consistently named information access as a relevant resource for their PD. Teachers reported that using online information was facilitated by a rising number of sites organized by teacher subject or interest areas. Search engines and sites like Connexions, Thinkfinity, iTunes University, Open Courseware, and a variety of others were referenced as essential tools for preparing lessons, getting new ideas, or finding communities of practice. Though not part of the growth trajectory experiences, many of the Teacher of the Year winners mentioned how valuable they found information posted in the TotY Facebook group to be to their ongoing growth too. Expert teachers were finding information, ideas, and resources online.

- Digital 'experiences' – Teachers shared narratives about a specific experience they had while spending time online or using a digital tool. Unlike the three 'online' resources above, digital experiences also included the use of a digital application, game, simulation, or model. Teachers that had *external realizations* often did so when exposed to a digital resource. When Pen saw digital poetry, she knew she wanted to make that part of her class. Likewise, when Joe saw how effective his class management

software was for communicating with students and parents, he invested more in it. Much more needs to be done to dig deeper on these experiences, define then more clearly, and deal with them as a discrete research topic.

- New digital tools – Finally, teachers explained that the use of a digital tool of production often led them to trying new practices upon using. If the teacher could access flip cameras, they could have students use them and produce projects that made use of the tools. Teachers were also driven to find PD when new tools were made available without PD (drop-in technology), but expressed a strong desire to have new tools come with appropriate PD.

Leadership suggestions for Digitally Mediated Resources:

Leaders can take away from this data that digitally mediated resources themselves are a powerful provider of PD for expert teachers. In the absence of formalized PD, teachers are influenced by the potential of digital tools, recognize student enthusiasm, and want to make the best use of modern means of production as possible in their classrooms.

As noted in chapter seven, teachers are enjoying unprecedented 'ease-of-use' when picking up new digital resources – so when they are available, and the teachers are willing to try them, the learning curve is relatively small. Teachers reported a desire for PD to come with any new technology, but they also sought it out when it was not available. Providing PD training, courses, and workshops for teachers to take could expand the number of teachers using technology for

teaching and learning beyond those highly motivated few – as more teachers find out how easy it is to integrate digital resources for powerful learning.

Also pointed out in chapter seven was that teacher pointed out their comfort with making mistakes as an asset in learning new technologies. This may explain why technology adoption was expressed as easier with student learners to help, encourage, and assist for many of the exemplary teachers. Students reported comfort with technology gave the teachers a level of comfort and agency with the technology they suggest would not have been there without student help. Leaders can then consider having workshops that invite teacher and student learners, clubs, design competitions, or time for collaborative design work. My own work with local districts, doing teacher-student 'game jams' confirms that when teachers and students work together with new technologies, teachers gain confidence, see models of learning, and review the time as more enjoyable.

Finally, teachers suggested that leaders are essential for the acquisition and expectations around the use of new digital technologies. Access and the conditions for open use (i.e. firewall design) can stop the use of digital media, or open up the potential of teachers to create entire courses – as was the case with Lucas' English class. Leaders can ensure the district restrictions are not learning restrictions, hold high expectations for the use of digital tools, but understand new methods require learning and experimentation, and maintain a partnership with teachers in the use of digitally mediated resources.

School leaders, seeking to improve student learning, work through their teachers as primary classroom agents of student learning. Principal impact on student learning is therefore teacher professional development and the instructional leadership they provide. School leaders can glean much from understanding the above data on teacher's narrated experiences and the evidence pointing at relevant PD for early adopters and exemplary practitioners.

Knowing that teachers in any given building will be at varying places in their trajectory of practice, school leaders should have a clear picture of exemplary practice as a target for all teachers and especially what experiences facilitate that growth. More broadly, leadership practices in general are well suited to use the findings from this study to help identify impact of practice, time/benefit analysis, and what purposeful use of 'permission' provides.

According to the findings above school leaders can best provide these relevant experiences by clearly defining their role as supporting teacher practice, and allowing exploratory efforts by teachers that have a new idea or technology they want to try with students. Support includes both the leveraging of institutional resources and navigation of bureaucratic demands for teacher innovation, but notice that teachers also valued a collegial relationship with principals in their own development. Support in terms of resources and interest were both valued, but the personal connection was more so. School leaders should therefore *start* with making time to know what innovative practices can be suggested to teachers, observe and support experimental lessons toward a co-

creative conversation on refinement, and set an expectation and enthusiasm for PD outside of district designed PD programming. The teachers in this study wanted to please their school leaders and had deep respect for their feedback and suggestions for improvement. On the contrary, many teachers also recalled school leaders that had other priorities, and they saw this as slowing, or halting, their professional trajectories.

For this reason, allowance of practice was the most relevant of leadership resources for teachers. This implies more than simple permission however. Effective leaders in this study gave permission, but also garnered the needed support from the school board, were ready to cover for failed efforts, exuded good humor about trail and error and encouraged teachers to teach first, and to let the administration worry about test preparation. This final point may be a luxury of schools that are performing well under the pressures of NCLB, or future inquiry may show that this is the trait of an exemplary school leader. Within the scope of this study we can only identify it as a positive influence on exemplary practice with needed future expansion of understanding.

Finally, school leaders need discretion and perhaps this discretion is a primary component of what they add to their teacher relationships. For instance, in terms of technology, school leaders need to assess practices weighing the time spent on the technology and the benefit potential of it. Far from supporting and allowing everything, effective principals in this study would ask questions of the teachers forcing them to think about time and benefit.

Implications for Future Research

Current frameworks for professional growth are laced with a top-down understanding of adult learning and PD. If we continue to assume that PD is 'delivered' from districts to teachers, then we miss many forms of relevant PD that occur informally, outside of the school, and/or from natural, contextual, situated learning from reflective practice, use of tools, peer-based conversations, and even from and with students. This study clearly shows that these resources for PD constitute the majority of relevant experiences for exemplary teachers. Efforts to perfect PD that is defined as irrelevant to expert practice will, at best, result in training that has minimal impact on actual leadership and classroom practices and cause a mis-definition of 'successful PD' and what leads to successful practice – as is this case in this vague 2008 review:

> "Researchers have looked at just about every possible determinant of teaching success, and it seems there is nothing on a teacher's resume that indicates how he or she will do in the classroom. While some qualifications boost performance a little bit… they just don't improve it very much". (Fisman, 2008)

Many of the nation's award-winning teachers, however, tell us that at the point of hire, their practices were far from expert, and they needed to retrain themselves mid-career to correct faulty practices. Uniform PD initiatives or hiring

qualifications that seek to “boost performance” may miss the highly individual trajectories of expert PD that actually exist across teachers.

Research efforts toward *differentiated* PD should be pursued based on the data here that shows multiple trajectories toward expert practice. Teachers, seeing minimal relevance from their training and PD, will abandon faulty training and seek out their own path to improving practice outside of the designed models in place. This is happening regularly among expert practitioners. Future research may show that among mainstream teacher practice, part of the problem is that they are doing what they are trained to do. This study shows a need to clarify not just how to improve traditional PD, but whether its effects are cumulatively distracting from expert trajectories of practice.

Further, future research should be further informed by methodology being used in other fields to understand teaching and learning in media studies, communication, economics, literacy studies, psychology and others. Informal and digitally mediated PD are much more difficult to research, using traditional approaches to school reform, because they are primarily bottom-up phenomena that defy clear pre and post testing, controlled variables, or fidelity of delivery. These all imply that PD is delivered to teachers, and excludes by assumption, the possibility of more powerful PD that is not packaged and administered to adult learners.

To better design certification and PD programming for teachers, each of the resources identified above needs further clarification and definition through

iterative design, the role of resources among teachers at varying stages of development should be investigated on a much larger scale that this study, and finally, validation of PD should continue to be rooted in what teachers and school leaders are telling us works.

21st century skills and the demands of NCLB require a renewed focus on how we prepare and provide ongoing PD for teachers. Far too much of traditional and current professional development practices are based on didactic instructional units, while at the same time, exemplary teachers are leveraging 21st century ICT and skills for their PD and practice. Informal and emergent digital media has shown itself to be central to the practices of the nation's awarded teachers and should be given much closer consideration for integration into teacher preparation and professional development programs.

Reformation of education in any direction hinges on expert practitioners both learning and designing effective classroom environments. This study clarifies what resources are currently relevant to those teachers we want to see more of, and suggests we study, pursue, provide and encourage these practices at scale.

Bibliography

Alag, S. (2008). *Collective intelligence in action*. Greenwich, Conn.: Manning.

Albion, P., & Ertmer, P. A. (2002). Beyond the foundations: The role of vision and belief in teachers' preparation for integration of technology. *TechTrends, 46*(5), 34-38.

Alozie, N. M. (2010). Collaborative Professional Development and Curriculum Enactment: Teacher Reflection to Inform Inquiry-Based Discussions in High School Science Classrooms Available from http://hdl.handle.net/2027.42/75893

Apple, M. (1991). The New Technology: is it part of the solution or part of the problem in education? . *Computers in Schools, 8*(1/2/3), 59-81.

Apple, M. (1993). *Official Knowledge: Democratic education in a conservative age*. New York: Routledge.

Apple, M., & Beane, J. A. (2007). *Democratic Schools: Lessons in Powerful Education* (2nd ed.). Portsmouth, NH: Heinemann.

Argyris, C. (1997). Learning and Teaching: A Theory of Action Perspective. *Journal of Management Education, 21*(1), 9-26.

Argyris, C. (1999). *On Organizational Learning* (2nd ed.). Malden, MA: Blackwell Publishing.

Armstrong, V., Barnes, S., Sutherland, R., Curran, S., Mills, S., & Thompson, I. (2005). Collaborative research methodology for investigating teaching and learning: The use of interactive whiteboard technology. *Educational Review, 57*(4), 457-469.

Ball, D. L., & Cohen, D. K. (1999). Developing practice, developing practictioners: Toward a practice-based theory of professional edcuation. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession* (pp. 3-31). San Francisco, CA: Jossey-Bass.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Barab, S. A., MaKinster, J. G., & Scheckler, R. (2003). Designing system dualities: Characterizing a web-supported professional development community. *Information Society, 19*(3), 237-256.

Becker, H. J. (2000). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools.

Contemporary Issues in Technology and Teacher Education, 1(2). Retrieved from http://www.citejournal.org/vol1/iss2/seminal/article1.htm

Becker, H. J., & Riel, M. M. (2000). *Teacher professional engagement and constructive-compatible computer usage (Report no. 7)*. Irvine, CA.

Belanger, Y. (2002). Laptop Computers in the K-12 Classroom. In M. A. Fitzgerald, M. Orey & R. M. Branch (Eds.), *Educational Media and Technolgoy Yearbook* (Vol. 27).

Bijker, W. E., Hughes, T. P., & Pinch, T. J. (1987). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: MIT Press.

Black, P., & William, D. (1998). Inside the Black Box: Raising Standards Through Classroom Assessment. *Phi Delta Kappan*.

Borko, H. (2004). Professional Development and Teacher Learning: Mapping the Terrain. *Educational Researcher, 33*(8), 3-15.

Brown, A., & Davis, N. (2004). *Digital technology, communities and education*. London ; New York: RoutledgeFalmer.

Bryk, A. S., Camburn, E., & Louis, K. S. (1999). Professional Community in Chicago elementary schools: Facilitating factors and organizational consequences. *Educational Administration Quarterly, 35*(5), 751-781.

Byrk, A. S., Sebring, P., Allensworth, E. M., Luppescu, S., & Easton, J. Q. (2010). *Organizing Schools for Improvement: Lessons from Chicago*. Chicago, IL: The University of Chicago Press.

Calderhead, J. (1996). Teachers: Beliefs and knowledge. In D. Berliner & R. Calfee (Eds.), *Handbook of Educational Psycology* (pp. 709-725). New York: Macmillan Library Reference.

Clark, L. V. (2008). Teacher professional development as a third space: Researcher and practitioner dialogues. In I. U. S. o. Education (Eds.) Available from http://gateway.proquest.com/openurl?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&res_dat=xri:pqdiss&rft_dat=xri:pqdiss:3330782

Cohen, D. K., & Ball, D. L. (1998). *Instruction, Capacity, and Improvement* (Guides - Non-Classroom No. ED431749): CPRE Publications, University of Pennsylvania, Graduate School of Education, 3440 Market Street, Suite 560,

Philadelphia, PA 19104-3325; Tel: 215-573-0700; Web site: http://www.upenn.edu/gse/cpre/ (

Cohen, D. K., & Barnes, C. A. (1993). Pedagogy and policy. In D. K. Cohen, M. W. McLaughlin & J. E. Talbert (Eds.), *Teaching for understanding: Challenges for policy and practice* (pp. 207-239). San Francisco, CA: Jossey-Bass Inc.

Cole, M. (2006). *The Fifth Dimension*. New York, NY: Russell Sage Foundation.

Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology : the digital revolution and schooling in America*. New York: Teachers College Press.

Collinson, V., Kozina, E., Lin, Y. H. K., Ling, L., Matheson, I., Newcombe, L., et al. (2009). Professional development for teachers: a world of change. *European Journal of Teacher Education, 32*(1), 3-19.

Conley, D. T. (1991). Lessons from laboratories in school restructuring and site-based decision making. *Oregon School Study Council Bulletin, 34*(7), 1-61.

Creswell, J. W. (1994). *Research Design: Qualitative and Quantitative Approaches*. Thousand Oaks, CA: Sage Publications.

Cuban, L. (1993). The Lure of Curricular Reform and Its Pitiful History. *Phi Delta Kappan, 75*(2), 182-185.

Cuban, L. (2010). *Tinkering toward utopia: the 2010 version*. Paper presented at the AERA 2010.

Daly, A. J. (2010). *Social network theory and educational change*. Cambridge, Mass.: Harvard Education Press.

Dawes, L. (1999). *Chalky and the Interactive Whiteboard: Media representation of teachers and technology*. Paper presented at the British Educational Reasearch Association.

Dede, C., Ketelhut, D. J., Whitehouse, P., Breit, L., & McCloskey, E. M. (2009). A Research Agenda for Online Teacher Professional Development. *Journal of Teacher Education, 60*(1), 8-19.

Desimone, L. M. (2011). A Primer on Effective Professional Development. *Phi Delta Kappan, 92*(6), 68-71.

Dewey, J. (1910). *How we Think*. Mineola, NY: Dover Publications, Inc.

diSessa, A. (2000). *Changing Minds: Computers, Learning, and Literacy*. Cambridge, MA: The MIT Press.

Dwyer, D. (1991). Changes in Teachers' Beliefs and Practices in Technology-rich Classrooms. *Educational Leadership, 48*(8), 45-52.

Elmore, R. F. (1996). *Restructuring in the Classroom: Teaching, Learning, and School Organization*. San Francisco, CA: Jossey-Bass.

Elmore, R. F., & Burney, D. (1997). *School Variation and Systemic Instructional Improvement*. Pittsburgh, PA: Institute for Learning, U.S. Department of Education.

Elmore, R. F., Peterson, P., & McCarthy, S. (1996). *Restructuring in the classroom*. San Francisco: Jossey-Bass.

Ertmer, P. A. (2005). Teacher Pedagogical Beliefs: The Final Frontier in Our Quest for Technology Integration? . *Education Technology Research and Development, 53*(4), 25-39.

Etheridge, R. (Producer). (2012, 2/16/12) *Dangerously Irrelevant*. Commentary retrieved from http://dangerouslyirrelevant.org/2012/02/are-teacher-preparation-programs-dangerously-irrelevant-guest-post.html#comments

Fisher, D., & Stolarchuk, E. (1998). *The effect of using laptop computers on achievement, attitude to science and classroom environment in science. .* Paper presented at the Western Austrailia institute for Educational Research Forum 1998, [Online].

Fisher, K., Fisher, M. D., & NetLibrary Inc. (1998). The distributed mind achieving high performance through the collective intelligence of knowledge work teamspp. xv, 286 p.). Available from http://www.netlibrary.com/urlapi.asp?action=summary&v=1&bookid=2462

Fisman, R. (2008). Hot for the Wrong Teachers: Why are public schools so bad at hiring good instructors? *Slate*.

Friedman, T. L. (2005). *The World is Flat: A Brieg History of the Twenty-first Century*. New York, NY Farrar, Straus and GIroux.

Fryer, R. G. J. (2011). Financial Incentives and Student Achievement: Evidence from Randomized Trials. *The Quarterly Journal of Economics, 216*(4), 1755-1798.

Fullan, M. (1993). Why Teachers Must Become Change Agents. *Educational Leadership, 50*(6).

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

Garcia, R., & Huseman, J. (2009). *Alternative Certification Programs: Meeting the Demand for Effective Teachers* (No. 675). Washington, D.C.: National Center for Policy Analysis.

Gardner, J. (1994). *Personal portable computers and the curriculum*. Edinburgh, Scotland: Scottish Council for Research in Education.

Garner, R. (2002). *Hanging Out*. Westport, CN: Bergin & Garvey.

Gatto, J. T. (2009). *Weapons of Mass Instruction: A Schoolteacher's Journey through the Dark World of Compulsory Schooling*. Gabriola Island, BC: New Society Publishers.

Gee, J. P. (2004). *Situated language and learning : a critique of traditional schooling*. New York: Routledge.

Gee, J. P. (2007). *What Video Games have to Teach us about Learning and Literacy*. New York, NY: Palgrave Macmillan.

Gee, J. P. (2010). *Presentation at AERA 2010.* Paper presented at the American Education Research Association Conference 2010, Denver, CO.

Gee, J. P., & Hayes, E. (2010). *Women and gaming: The Sims and 21st-century learning*. New York: Palgrave Macmillan.

Gerstner, L. V. J. (2006). *Teaching at Risk: Progress & Potholes: Final Report Spring 2006*. New York, NY: The Teaching Commission.

Glaser, B., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for qualitative research* (4th ed.). Piscataway, NJ: Transaction Publishers.

Glazer, E., Hannafin, M. J., & Song, L. (2005). Promoting Technology Integration Through Collaborative Apprenticeship. *Education Technology Research and Development, 53*(4), 25-39.

Gomez, L. M., Sherin, M. G., Griesdorn, J., & Finn, L. E. (2008). Creating social relationships - The role of technology in preservice teacher preparation. *Journal of Teacher Education, 59*(2), 117-131.

Goodwyn, A., Adams, A., & Clarke, S. (1997). The Great God of the Future: The views of current and future English teachers on the place of IT in literacy English. *Education, 31*(2), 54-62.

Gosen, D. L. (2010). A Case-Study Analysis of the Role and Influence of Tools in the Practice of a Teacher(-Leader) within the Context of a Professional Development Project Available from http://hdl.handle.net/2027.42/78879

Greeno, J. G., Collins, A., & Resnick, L. B. (1996). Cognition and learning. In D. Berliner & R. Calfee (Eds.), *Handbook of educational psychology* (pp. 15-46). New York: Macmillan.

Guhlin, M. (1996). Stage a well-designed Saturday session and they will come! *Technology Connection, 3*(3), 12-14.

Hadley, M., & Sheingold, K. (1993). Commonalities and distinctive patterns in teachers' integration of computers. . *American Journal of Education, 101*, 281-315.

Halverson, E., & Halverson, R. (2011). Education as Design for Learning: A Model for Integrating Education Inquiry Across Research Traditions. In C. F. Conrad & R. C. Serlin (Eds.), *The SAGE Handbook for Research in Education* (Vol. III). Thousand Oaks, CA: SAGE Publications.

Halverson, R. (2010). School formative feedback systems. *Peabody Journal of Education, 85*(2), 130-146.

Halverson, R., & Clifford, M. (2006). *Evaluation in the Wild: A Distributed Cognition Perspective on Teacher Assessment*.

Halverson, R., & Dikkers, S. (in progress). Formative Leadership for Learning: Leveraging Empirical Studies of Educational Leadership for Formative Tools.

Halverson, R., & Smith, A. (2009). How new technologies have (and have not) changed teaching and learning in schools. *Journal of Computing in Teacher Education, 26*(2), 49-54.

Harwood, W. S. (2001). 21st century teachers project: Indiana University's response to the call for teacher preparation reform. *Abstracts of Papers of the American Chemical Society, 222*, U200-U200.

Hausman, C. S., & Goldring, E. B. (2001). Sustaining teacher commitment: The role of professional communities. *Peabody Journal of Education, 76*(2), 30-51.

Hoy, A., & Hoy, W. (2006). *Instructional Leadership: A research-based guide to learning in schools*. Boston, MA: Pearson.

Hu, W. (2007, May 4, 2007). Seeing No Progress, Some Schools Drop Laptops*. The New York Times*. Retrieved from

http://www.nytimes.com/2007/05/04/education/04laptop.html?_r=1&ei=5070&en=9c2c180fe002a707&ex=1179028800&emc=eta1&pagewanted=print

Hutchins, E. (1995a). *Cognition in the wild*. Cambridge, MA: MIT Press.

Hutchins, E. (1995b). How a cockpit remembers its speed. *Cognitive Science, 19*(3), 265-288.

Hutchins, E. (1995c). How a Cockpit Remembers Its Speeds. *Cognitive Science, 19*(3), 265-288.

ISTE. (2010). International Society for Technology in Education Website. from http://www.iste.org/AM/Template.cfm?Section=NETS

Ito, M., Horst, H., Bittanti, M., boyd, d., Herr-Stephenson, B., & Lange, P. G. (2008). *Living and Learning with New Media: Summary of Findings from the Digital Youth Project.* . Chicago, IL: The MacArthur Foundation.

Jenkins, H., Purushotma, R., Weigel, M., Clinton, K., & Robinson, A. J. (2009). *Confronting the Challenges of Participatory Culture: Media Education for the 21st Century*. Cambridge, MA.

Kagan, D. M. (1992). Implications of research on teacher belief. *Educational Psychologist, 27*(1), 65-90.

Kelley, C. J., & Shaw, J. J. (2009). *Learning first! A school leader's guide to closing achievement gaps*. Thousand Oaks, CA: Corwin.

Kennewell, S. (Producer). (2006) Reflections on the interactive whiteboard phenomenon: a synthesis of research from the UK Swansea School of Education. retrieved from http://www.aare.edu.au/06pap/ken06138.pdf

Lankshear, C., & Knobel, M. (Eds.). (2008). *Digital Literacies: Concepts, Policies, and Practices* (Vol. 30). New York, NY: Peter Lang.

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. New York, NY: Cambridge University Press.

Leander, K. M., & Lovvorn, J. F. (2006). Literacy Networks: Following the Cicculation of Texts, Bodies, and Objects in the Schooling and Online Gaming of One Youth. *Cognition and Instruction, 24*(3), 291-340.

Leithwood, K., & Jantzi, D. (2005). A review of transformational school leadership research: 1996-2005. *Leadership and Policy in Schools, 4*(3), 177-199.

Leithwood, K., Seashore-Louis, K., Anderson, S., & Wahlstrom, K. (2004). *Executive Summary: How leadership influences student learning*. New York, NY: The Wallace Foundation.

Leithwood, K., Seashore-Louis, K., Anderson, S. E., & Wahlstrom, K. (2010). *Learning from Leadership: Investigating the Links to Improved Student Learning*. Minneapolis, MN: Wallace Foundation.

Levitt, S. D., & Dubner, S. J. (2005). *Freakonomics: A rogue economist explores the hidden side of everything*. New York, NY: William Morrow/HarperCollins.

Lieberman, J. (2009). Reinventing Teacher Professional Norms and Identities: The Role of Lesson Study and Learning Communities. *Professional Development in Education, 35*(1), 83-99.

Lightfoot, S. L. (1983). *The Good High School*: Basic Books, Inc.

Louis, K. S. (2006). Changing the culture of schools: Professional community, organizational learning, and trust. *Journal of School Leadership 16*(4), 477-489.

Louis, K. S. (2011). Adoption of and Preparation for Collaborative Data Practices. In D. Comments (Ed.), *UCEA Convention 2011*. Pittsburgh, PA.

Lowther, D. L., Ross, S. M., & Morrison, G. M. (2003). When each one has one: The influences on teaching strategies and student achievement of using laptops in the classroom. *Educational Technology Research and Development, 51*(3), 23-44.

Mathews, J. (2010). Using a studio-based pedagogy to engage students in the design of mobile-based media. *English Teaching: Practice and Critique, 9*(1), 87-102.

Mayo, M. (2010). Bringing Game-Based Learning to Scale: The Business Challenges of Serious Games. *International Journal of Learning and Media, 2*(2-3), 81-100.

McAdams, D. P. (2011). Exploring Psychological Themes Through LIfe-Narrative Accounts. In J. A. Holstein & J. F. Gubrium (Eds.), *Varieties of Narrative Analysis*. Los Angeles, US: Sage Publications.

McAdams, D. P., & Logan, R. L. (2006). Creative work, love, and the dialectic in selected life stories of academics. In D. P. McAdams, R. Josselson & A. Lieblich (Eds.), *Identity and story: Creating self in narrative* (pp. 89-108). Washington, D. C.: American Psychological Association.

McLoed, S. (2011). Shift Happens v5 - Iowa, Did you Know? [Video]. Retrieved 3/6/2012, from http://dangerouslyirrelevant.org/2011/08/shift-happens-v5-iowa-did-you-know-video.html

Means, B., & Olson, K. (1997). *Technologies Role in Education Reform: Findings from a National Study of Innovating Schools.* Washington, D.C: Department of Education, Office of Edcuational Research and Improvement.

Mockler, N., & Groundwater-Smith, S. (2009). Teacher Professional Learning in an Age of Compliance Mind the Gap. In SpringerLink (Online service) (Eds.) Available from http://dx.doi.org/10.1007/978-1-4020-9417-0

Monke, L. (1997). Infusing Technology into a School: Tracking the unintended consequences. *Bulletin of Science Technology & Society, 19*(1), 5-10.

Moseley, D., Higgins, S., Bramald, R., Hardman, F., Miller, J. J., Mroz, M., et al. (1999). *Ways Forward With ICT: Effective pedagogy using information and communications technology for literacy and numeracy in primary schools*. London, UK: Teacher Training Agency.

Moss, G., Jewitt, C., Levaaic, R., Armstrong, V., Cardini, A., & Castle, F. (2007). *The Interactive Whiteboard, Pedagogy and Pupil Performance Evaluation: An Evaluation of the Schools Whiteboard Expansion (SWE) Project:* : London Challenge.

Mumtaz, S. (2000). Factors Affecting Teachers' Use of Information and Communications Technology: a review of the literature. *Journal of Information Technology for Teacher Education, 9*(3).

Murray, D. E. (2008). *Planning change, changing plans : innovations in second language teaching*. Ann Arbor: University of Michigan Press.

NCEI. (2005). Alternative Routes to Teacher Certification: An Overview. Retrieved 3/15/2012, from http://www.ncei.com/Alt-Teacher-Cert.htm

NCLB. (2008). No Child Left Behind Act of 2001. *20*(U.S.C.), § 6319.

Newmann, F. M., Smith, B., Allensworth, E. M., & Bryk, A. S. (2001). Instructional Program Coherence: What It Is and Why it Should Guide School Improvement Policy. *Educational Evaluation and Policy Analysis, 23*(4), 297.

NewMediaConsortium. (2005). *A Global Imperative: The Report on the 21st Century Literacy Summit.* . Stanford, CA: The New Media Consortium.

Nielsen, M. (2012). *Reinventing Discovery*. Princeton, NJ: Princeton Universtiy Press.

NWEA. (2012). Measures of Academic Progress. Retrieved 3/4/12, from http://www.nwea.org/products-services/computer-based-adaptive-assessments/map

Odden, A., & Kelley, C. (1997). *Paying Teachers for What They Know and Do*. Thousand Oaks, CA: Corwin Press.

Olson, J. (1981). Teacher Influence in the Classroom: a context for understanding curriculum change. *Instructional Science, 10*, 259-275.

Osborne, J., & Hennessy, S. (2003). Literature Review in Science Education and the Role of ICT: Promise, Problems and Future Directions. *Science Education, 2008*(10/02).

OTA. (1995). *Teachers and Technology: Making the Connection (OTA-HER-616)*.

Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research, 62*(3), 307-332.

Pedretti, E., Smith-Mayer, J., & Woodrow, J. (1999). Teaming Technology Enhanced Instruction in the Science Classroom and Teacher Professional Development. *Journal of Technology and Teacher Education, 7*, 131-143.

Penuel, W. (2006). Implementation and Effects of One-to-One Computing Initiatives: A Research Synthesis. *Journal of Research on Technology in Education, 38*(3), 329-348.

Peterson, K. D. (2002). *Effective Teacher Hiring: A Guide to Getting the Best*. Alexandria, VA: ASCD.

Pickering, T. (2012). Understanding the Education System. Retrieved 2/6/2012, 2012, from http://www.slideshare.net/mcleod/understanding-the-education-system-trace-pickering

Pinch, T. J., & Bijker, W. E. (1984). The social construction of facts and artefacts: or how the sociology of science and the sociology of technology might benefit each other. *Social Studies of Science, 14*(August), 399-441.

Posner, G. J., Strike, K. A., Hewson, P. W., & Gertzog, W. A. (1982). Accomodation of a scientific conception: Toward a theory of conceptual change. *Science Education, 66*, 211-227.

Postman, N. (1979). *Teaching as a Conserving Activity*: Delacourte Press.

Rentschler, T. (2006). *No Child Left Behind: Admirable Goals, Disastrous Outcomes*: Widener Law Review.

Richardson, J., Flora, K., & Bathon, J. (2011). *Creating a Technology Vision in School Leaders*. Paper presented at the The University Council for Educational Administration.

Rideout, V., Foehr, U. G., & Roberts, D. F. (2010). *Generation M2: Media in the Lives of 8- to 18-Year-Olds*. Menlo Park, CA: Henry J. Kaiser Family Foundation.

Robertson, S. I., Calder, J., Fung, P., Jones, A., O'Shea, T., & Lambrechts, G. (1996). Pupils, Teachers and Palmtop Computers. *Journal of Assissted Learning, 12*, 194-204.

Schunk, D. H. (2000). *Learning theories: An educational perspective* (3rd ed.). Upper Saddle River, NJ: Merrill/Prentice Hall.

Seels, B. B., & Richey, R. C. (1994). *Instructional technology: The definitions and domains of the field*.

Senge, P. M. (1990). *The Fifth Discipline*. New York, NY: Doubleday Currency.

Sheingold, K., & Hadley, M. (1990). *Accomplished teachers: Integrating computers into classroom practice*. New York: Center for Technology in Education.

Sheldon, S. B., & Epstein, J. L. (2002). Improving student behavior and school discipline with family and community involvement. *Education and Urban Society, 35*, 4-26.

Smylie, M., & Hart, A. (1999). School leadership for teacher learning and change: A human and social capital development perspective. In I. J. M. K. S. L. (Eds.) (Ed.), *Handbook of research on educational adminstration (2nd Edition)* (pp. 421-442).

Somekh, B. (2008). Factors Affecting Teachers - Pedagogical Adoption of ICT. In J. Voogt & G. Knezek (Eds.), *International Handbook of Information Technology in Primary and Secondary Education* New York: Springer.

Songer, N. B., Lee, H., & McDonald, S. (2003). Research towards an expanded understanding of inquiry science beyond one idealized standard. *Science Education, 87*(4), 490-516.

Sparks, D., & Hirsh, S. (1997). *A new vision for staff development*. Alexandria, VA: Association for Supervision and Curriculum Development.

Spillane, J. P., Halverson, R., & Diamond, J. B. (2004). Towards a theory of leadership practice: A distributed perspective. *Journal of Curriculum Studies, 31*(1), 3-34.

Spillane, J. P., & Louis, K. S. (2002). School Improvement Processes and Practices: Professional Learning for Building Instructional Capacity. *Yearbook of the National Society for the Study of Education, 101*(1), 83-104.

Spillane, J. P., & Louis, K. S. (2005). School Improvement Processes and Practices: Professional Learning for Building Instructional Capacity *Yearbook of the National Society for the Study of Education*.

Squire, K., & Dikkers, S. (2012). Amplifications of learning: Use of mobile media devices among youth. *Convergence: The International Journal of Research into New Media Technologies*. Retrieved from http://con.sagepub.com/content/early/2012/02/15/1354856511429646.full.pdf+html. doi:10.1177/1354856511429646

Squire, K., & Jan, M. (2007). Mad City Mystery: Developing Scientific Argumentation Skills with a Place-based Augmented Reality Game on Handheld Computers. *Journal of Science Education and Technology, 16*(1), 5-29.

Stake, R. E. (2006). *Multiple Case Study Analysis*. New York, NY: The Guilford Press.

Steinkuehler, C. (2006). Massively multiplayer online videogaming as participation in a discourse. *Mind, Culture, and Activity, 13*(1), 38-52.

Steinkuehler, C., & Duncan, S. (2008). Scientific Habits of Mind in Virtual Worlds. *Journal of Science Education and Technology, 17*(6), 530-543.

Steinkuehler, C., & Williams, D. (2006). Where everybody knows your (screen) name: Online games as "third places". *Journal of Computer-Mediated Communication, 11*(4), -.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage Publications, Inc.

Talbert, J. E., & McLaughlin, M. W. (1994). Teacher professionalism in local school contexts. *American Journal of Education, 102*(2), 123-153.

Tomlinson, C. A., & McTighe, J. (2006). *Integrating differentiated instruction: Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.

Trilling, B., & Fadel, C. (2009). *21 Century Skills: Learning for Life in our Times*. San Francisco, CA: Jossey-Bass.

Valenzuela, A. (Ed.). (2005). *Leaving Children Behind: How "Texas-style" Accountability Fails Latino Youth*. Albany, NY: State University of New York Press.

Veen, W. (1993). How Teachers Use Computers in Instructional Practice: four case studies in a Dutch secondary school. *Computers and Education, 21*(1/2), 1-8.

Wahlstrom, K., & Louis, K. S. (2008). How teachers experience principal leadership: The roles of professional community, trust, efficacy and shared responsibility. *Educational Administration Quarterly, 44*(4), 458-495.

Wayman, J. C., Midgley, S., & Springfield, S. (2006). *Leadership for data-based decision making: Collaborative educator teams*. Paper presented at the Annual meeting of the American Educational Research Association.

Webb, M., & Cox, M. (2004). A review of pdagogy related to information and communications technology. *Technology, Pedagogy and Education, 13*(3), 235-286.

WWC. (2012). What Works Clearinghouse. Retrieved 3/3/12, 2012, from http://ies.ed.gov/ncee/wwc/

Yin, R. (1984). *Case study research: Design and method*. Beverly Hills, CA: Sage.

Youngs, P., & King, M. B. (2002). Principal Leadership for Professional Development to Build School Capacity. *Educational Administration Quarterly, 38*(5), 643-670.

YouPD. (2012). YouPD: Rethinking Professional Development for Teachers. *Digital Media and Learning Competition 4: Badges for Lifelong Learning* Retrieved 3/15/12, from http://www.dmlcompetition.net/Competition/4/badges-projects.php?id=3335

APPENDIX 1: Participant Bios

Teaching Participant Bios

All bio texts are taken from publicly available award sites (usually press releases upon being awarded from the state level association) and modified to fit profile format.

Andrew Peterson - "Broken Tech" Teaching Innovator/Presenter

Westshore, MI - Technology

Interviewed 3/7/11

Gaming has been part of Andrew's life for as long as he could avoid chewing on the dice. Everything from Bridge to D&D was played during his formative years. It was only logical that Andrew pursued his geekness and received a Bachelor's degree in Business and Computer Information Systems from Northern Michigan University. During that time, games were more likely the cause of a C- than anything academic. It wasn't until Andrew's pursuit of his Master's degree in Curriculum and Instruction that he learned that gaming could be used for the power of good. Andrew put his knowledge to good use and was a critical part of implementing the Computer Animation and Simulation (the academic way of saying gaming) Degree at West Shore Community College. Andrew has taught Computer Animation, Game Design and Network Security courses at WSCC. Andrew Peterson is currently an Instructional Technologist at Ferris State University.

Lucas Gillispie - World of Warcraft/Minecraft Innovator/Presenter

Burgaw, NC - English, Language Arts

Interviewed 3/8/11

Lucas has been an educator for more than a decade now, working as a high school science for ten years before taking a position as a district-level instructional technology coordinator for Pender County Schools in southeastern North Carolina. Lucas holds a MS in Instructional Technology from the University of North Carolina Wilmington where he completed thesis work researching the effects of a 3D video game on middle school students' achievement and attitude in mathematics. His interests include gaming in education particularly the use of MMORPG's (Massively Multiplayer Online Roleplay Games), mobile game-based learning, virtual training and simulations. His current projects include the WoWinSchool Project, a collaborative effort to explore the impact of using World of Warcraft in both an after-school program and as part of the regular instructional program, Minecraft in School, which seeks to explore the use of Minecraft in with elementary learners, and iPod Games for Learning, a program that uses the iPad and iPod Touch as platforms for game-based learning. His presentations have been well-received at Games, Learning, and Society, ISTE, Virtual Worlds Best Practices in Education, Games in Education, NCTIES, and NCDLA among others.

Jeremiah McCall - Strategy Games Innovator/Presenter/Writer

Cincinnati, OH - History

Interviewed 3/11/11

Jeremiah McCall, has been teaching high school history for more than a decade, mostly at Cincinnati Country Day School, a school known nationally for its effective integration of learning technologies into an academically rigorous curriculum. His first professional love is high school teaching, especially designing instructional strategies that will engage and challenge his students to learn and grow. In addition to teaching more conventional courses that incorporate simulation gaming, he teaches senior electives on (tabletop) historical simulation design, and the intersection of serious computer games and contemporary global issues. McCall has a PhD in ancient history from Ohio State University; he authored a book on the cavalry of the Roman Republic (Routledge 2001) and continues to research and write on Roman history topics. He is also the author of Gaming the Past: Using Video Games to Teach Secondary History (Routledge 2011), a guide to designing effective lessons around simulation games. He speaks regularly at conferences on games and learning like the Education Arcade and the Games, Learning & Society Group, and delivers school workshops on using historical simulation games. He also serves on the advisory board of the Games, Learning, and Society Conference and maintains this website, one of the primary sites devoted to the use of historical simulations

in classroom teaching.

From http://gamingthepast.net/about/

Peggy Sheehy - Second Life/World of Warcraft Innovator/Presenter

New York, NY - Elementary

Interviewed 3/15/11

After a twenty-five year career as a professional vocalist, Peggy Sheehy received a BS in Musical Performance and Education from Empire State University. She began teaching in 1997 at Mt. Sinai Elementary School in Mt. Sinai, New York and was also a district technology trainer. After receiving her Master's Degree in Educational Technology from Stony Brook University, she became an advocate for the authentic use of technology in education, and presented her ideas and experiences at conferences and workshops throughout the North East. She received the Technology Teacher of the Year for two consecutive years from ASSET, (Association of Suffolk County Supervisors for Educational Technology). She is a fierce advocate for the meaningful infusion of technology in education and in 2006 established the first middle school educational presence in Teen Second Life: Ramapo Islands. Well into their second year of learning in Second Life, Ramapo Islands now hosts over 1000 students and their teachers. Ms. Sheehy has presented her work across the country and is a true pioneer in virtual world education, she is sought out for advice, curriculum direction and

professional development for those that would follow in the footsteps of Ramapo Islands. Her vision encompasses a globally collaborative 3-D virtual world campus where learning is student-centered, product-based, playful, and creative. Her latest venture, MetaVersEd Consulting Ltd., supports the proposal, design, acquisition, and implementation of education in MUVEs. Ms. Sheehy believes that engagement, edutainment, and the authentic application of 21st Century collaborative tools in education is paramount to preparing our students for success.

James Mathews - Mobile/Place-Based Innovator/Presenter

Middleton, WI - Social Studies

Interviewed 3/16/11

Jim is a doctoral candidate in the Department of Curriculum and Instruction (Educational Communications and Technology). His research interests include mobile learning, Augmented Reality gaming, self-organized learning groups, location-based interactive storytelling and place-based learning. Through his work at the Local Games Lab Jim designs and researches mobile-based games and curriculum aimed at connecting students and teachers with their local communities. Jim also has fifteen years experience as a high school teacher. His communication arts-based curriculum helps students investigate their local communities through documentary filmmaking, photography, creative writing, and

service learning projects.

Joseph Croteau - TeacherGate Innovator/Designer

Northglenn, CO - History

Interviewed 10/27/11

Joseph Croteau has been teaching high school for the past thirteen years, he has taught the past twelve years at Northglenn High School in Colorado. He teaches College Prep American History and World Geography / Government to 11th and 9th grade students. He started his college career at Colorado State University in the Recreation and Tourism field, getting a degree in Natural Resources Recreation and Tourism. From there he began teaching outdoor education before starting up and running a fly fishing company for 17 years for the YMCA of the Rockies. Going back to get his second Bachelors, this time in Education, he models his classroom after the Outdoor Education hands on experience. He has an interest in alternative methods for education including advanced kinesthetic learning, activity engagement, and using technology in education. His latest venture has him developing online lesson planning software which can be utilized by educators online and through cell phone mobile applications.

Josh DeSantis - ING 2010

Susquenita, Pennsylvania - History

Interviewed 9/19/11

"'Young Historians' is the winning program created by DeSantis for students at Susquenita Middle School. The program will provide students with the opportunity to interpret the history of their communities - the towns of Duncannon and Marysville - for their families, neighbors and school. Students will conduct research, develop narratives and create public historical interpretations. They will complete secondary source readings about local history and form small teams to develop topic ideas relating to their communities. The eighth-grade students will use their research to develop lesson plans and illustrate children's books, which they will implement and read respectively to fifth-grade students at the school. At the end of the program, students will share their audio-visual presentations and walking tours to the community during a Heritage Day celebration in 2011. DeSantis, who lives in Camp Hill, hopes that the project will emphasize student-centered interpretations of history and serve as a model for other educators."

Tanya Keinlen - ING 2011

Worland, Wyoming - Math

Interviewed 9/19/11

"Kienlen's innovative program, "Tech It Up", was developed to provide students

with an environment where they can be engaged and actively involved in their learning process through the use of the Apple iPad. The goal of the program is to put technology in the hands of students for powerful learning. Using iPads in the classrooms as independent, hands-on tools for learning, first-grade students at West Side School gain a deeper understanding of computation, problem solving, and patterns. Educational apps will be downloaded on the iPad for students to create their own math problems, write poems and riddles, and then email or print their work. During a "family day" event, students will invite family members and friends to school to share their knowledge of what they have learned and accomplished on the iPad. This will provide an opportunity for shared learning. The program will be evaluated by online assessments and quizzes on the iPad to track the students' progress. With the funds from the ING grant, Kienlen will purchase iPads for the class with the ultimate goal of expanding the program to all first-grade students in Washakie County."

Patricia Astler - PAEMST 2011

Castle Rock, Colorado - Science

Interviewed 9/20/11

"Chantel Astler has been an elementary educator for 14 years and has spent the past 5 years as the science teacher at Flagstone Elementary in the Douglas

County School District. She has also taught Science Methods for Elementary Teachers at Adams State College. Using inquiry, Chantel engages students by exploring real-world scientific questions and using science notebooks to develop their thinking around scientific topics. Having a passion for creating a Green School environment, Chantel has challenged students to find ways to reduce energy usage. As a result, student teams have reduced Flagstone's energy usage by 20 percent and have earned a refund from the district. Chantel has shared her passion for science by creating a Family Science Night, participating in NASA's Student Involvement Program, and acting as a Teacher Liaison for the Space Foundation. Chantel has presented at both district and national science conferences, helping teachers realize their potential in inquiry instruction. Chantel has a B.A. in psychology from Metropolitan State College and an M.A. in elementary education, with an emphasis in science, from the University of Colorado at Denver. She holds a master teacher certification in elementary education and has achieved National Board Certification in early adolescent science."

Dave Boardman - NWP Profiles in Practice Oakland, Maine - English

Interviewed 9/21/11

"Dave Boardman, executive director of LiteracySparks, a Maine-based nonprofit that develops creative learning solutions for adolescents using technology, runs

digital storytelling and filmmaking programs for both teachers and students. He teaches English and filmmaking at Messalonskee High School in Oakland, Maine, and is a teacher consultant with the Maine Writing Project. Named the 2006 Instructional Technology Teacher of the Year by the Association of Computer Technology Educators of Maine, in 2007 Dave was a key organizer of Maine's first Digital Storytelling Festival for students, a result of a grant that allowed the Maine Writing Project to fund a team of educators to study storytelling and how teachers can use digital tools to improve writing. Dave coordinates technology professional development for school districts in central Maine and is conducting doctoral research into effective 21st century teaching practices. His blog, Digital Recess, shares some of his thoughts on teaching and learning with technology. His most recent article is "Inside the Digital Classroom" (The Neglected "R"; Rethinking Writing Instruction in Secondary Classrooms, 2008).

Writing Superheroes: http://youtu.be/s13jL4bc1hc”

Rebecca Pilver - ING 2010

Willington, Conneticut - History

Interviewed 9/22/11

“‘Connecticut: The Contribution State" is Pilver's three-part winning program that focuses on the past, present and future of the state of Connecticut. Fourth

graders in Willington and Chaplin, Conn. will transform into researchers, documentary producers and historians as they explore the legacy behind contributions made by Connecticut's own residents. Findings will be shared through multimedia projects and published on a wiki, a Website that is a collaboration of multiple sites. Pilver hopes to introduce students to role models other than celebrities to learn that the character of a person is just as important as his or her contribution. The goal of the project is to help mold students into productive and active citizens by making the past purposeful for the future. Pilver is a fourth-grade teacher and lives in Willington."

Paulette Saatzer

West St. Paul, Minnesota - Science

Interviewed 9/27/11

"Paulette Saatzer has been an educator for 32 years and has spent the last 14 years teaching kindergarten at Garlough Environmental Magnet in the West Saint Paul-Mendota Heights-Eagan area school district. She has also taught at Saint Joseph's Catholic School and Mount Calvary Lutheran School in Minnesota and Holy Cross Lutheran School in Tennessee. Paulette's passion for teaching science goes beyond the classroom. Her leadership skills have helped create a nationally recognized magnet school where the role of science is central to the curriculum. She directs the Journey North whole-school Symbolic Migration

activity and has created simple tools for her students to use when exploring outside. She recently began a program with her students' families called "Weekend Naturalist." Paulette has hosted many future teachers and student observers in her classroom. She readily hosts education classes from Saint Catherine's University and has taught the university's kindergarten methods course. Paulette has presented sessions on exploring science inside and outside the classroom with young children at the district, state, and national levels. Paulette has a B.A. in education from Concordia University, Saint Paul and an M.Ed. in early childhood education from the University of Minnesota."

Pen Campbell St. Joseph, Michigan - English

Interviewed 9/28/11

"A veteran presenter of digital storytelling workshops for teachers and students, Pen Campbell teaches College Writing and Journalism at St. Joseph High School in St. Joseph, Michigan, and is a co-director of the Third Coast Writing Project at Western Michigan University. Her published writing includes 'NWP Speaks: 30 Years of Writing Project Voices' (The Voice, Vol. 9, No. 2, 2004), a review of Bob Sizoo's book Teaching Powerful Writing (The Quarterly, Vol. 25, No. 1, 2003), and 'Episodic Fiction: Another Way to Tell a Story" (The Quarterly, Vol. 23, No. 3, 2001). 'The challenges that inevitably arise allow – even force – us to think critically together and for students to see me, the teacher, in real problem-solving

situations and not as someone with all the answers. When I can call out, ‘Who can show me how to embed this video in the PowerPoint program?" and a student comes over to show me, she becomes the expert of the moment, and that’s a great thing.’”

Robin Bucaria - ING 2011

West Jordan, Utah - Science

Interviewed 9/29/11

“Bucaria’s innovative program, “Skywriting 2.0: Explorations from the Urban Wild”, is a cross-curricular project developed for 11th and 12th-grade students at Copper Hills High School. By integrating astronomy, biology, chemistry, and language arts, the goal of the program is to use cloud-based collaboration to increase observation, reading, inquiry, writing, and technology skills. Students will read the works of various nature writers such as Terry Tempest Williams, Henry David Thoreau, and Ralph Waldo Emerson to consider their relation to the natural world. In astronomy, biology, and chemistry classes, participants will learn the science behind the observations of the authors they study and post the explanations on a research wiki. They will also conduct fieldwork within their environment by collecting data on astronomical occurrences, making biological observations of the flora and fauna in the area, and conduct environmental assessments. Existing video and photography resources will be used to record

the observations. Through the program, students will be prepared with the collaboration and technology skills necessary for the working world. Bucaria, who lives in Salt Lake City, hopes the program will help students, parents, and the community to learn of the interplay between humans and the environment."

David Hinrichs - ING 2011

Clayton, North Carolina - Interdisciplinary

Interviewed 9/30/11

"The winning program, "Screencasting in the Classroom", was developed by Hinrichs and his colleagues for students to use Apple iPads to create screencasts. Screencasts are small movies that are recorded directly from the screen of an electronic device. For the project, seventh-grade students at Riverwood Middle School will use a small microphone and software to create screencasts by writing directly on the screen of an iPad. Through the use of the iPads, students will get the opportunity to learn in a relevant, meaningful, and even crucial manner to ensure they are ready to participate in the highly advanced, global society. The iPads will also help students move their learning environment into the 21st century. Once the movies have been produced, they will be posted online which will allow participants to share their screencasts with their peers, parents, and the global community via the Internet. With the funds from the ING grant, the teachers will purchase iPads, microphones, and

screencasting software programs to implement the project. The goal is to allow students to create resources that make them an active part of learning while providing instruction to others instead of simply receiving it."

Megan Tucker

Fort Walton Beach, Florida - Science

Interviewed 10/3/11

"Megan Tucker has taught fourth grade science for 7 years and is currently the Science Committee Chair at Kenwood Elementary School. Megan's love of science extends year-round, and she has taught at summer science enrichment camps for students. She was the Hurlburt 398 Chapter Air Force Association Teacher of the Year in 2008. She was selected in a nationwide competition to attend the America's Teachers Program held by the National Training and Simulation Association. Megan is a published author on Science Netlinks. Always engaged in some aspect of science, Megan attended Educator Space Camp in Huntsville, AL. She works closely with the Air Force Association and the Aviation Institute at the local high school. She teaches workshops on aviation; has written numerous science, technology, engineering, and mathematics grants; and has seamlessly integrated aerospace into her elementary curriculum. In 2010, Megan was chosen as the National Civil Air Patrol Aerospace Connections in Education Coordinator of the Year. Megan has a B.S. in elementary education from Auburn

University. She is currently working on a Master's of Science Education from Walden University. She is gifted endorsed and certified in elementary and middle grades education. She is a National Board Certified Middle Childhood Generalist."

Holly Lannert - ING 2010

Palatine, Illinois - History

Interviewed 10/4/11

"Lannert's winning program, 'The Amazing Hunt Through Ancient Civilizations,' incorporates a slice from reality television and technology. The students will become 'reality video podcast' hosts. Not only will they get to demonstrate their knowledge of the communication system, inventions and daily life of an ancient civilization, they will become proficient in using various types of technology, including video and digital cameras, netbooks, and a Smart Board. The students will also involve the intranet and Internet viewers by developing a challenge question and activity challenges, as well as develop rules for the game and act as directors and producers. Approximately 125 sixth-grade students at Stuart R. Paddock Elementary School will participate, but the reach will be much greater when the project is uploaded to the internet."

Allen Robnett - AFA 2010 & AMF 2010

Gallatin, Tennessee - Science

Interviewed 10/12/11

“Robnett has been a teacher for 29 years. He currently teaches algebra, physics, aviation, and astronomy at Gallatin High School in Gallatin TN. His interest in aerospace education began in 2005 when he attended “Eyes on the Skies” workshop at Vanderbilt University. Since then, he has incorporated all forms of aerospace education into his classes. In response to the nationwide problem of diminished participation in science classes at the secondary level, he helped obtain approval from the State Department of Education to create two innovative programs in the science department of Gallatin High School: ‘Aviation Theory and Practice’ and ‘Astronomy and Space Exploration.’”

Benjamin Jewell - PAEMST 2011

Hudsonville, Michigan - Science

Interviewed 10/24/11

“Benjamin Jewell has taught fifth grade at Bauer Elementary since 2009. Previously, he taught middle school science at Baldwin Street Middle School in Hudsonville, MI. He began his teaching career in 2003 at Ridge Park Charter Academy. Crafting lessons that engage all students, Ben finds creative ways to engage a student’s inquisitive mind. From collaborative projects using mobile

devices to his effective questioning and use of problem-based learning, he inspires all students to think at the highest level. Ben has served on the Curriculum Council and Technology Vision Committee, integrating his pedagogical expertise in inquiry-based design into all curriculum areas. His innovative, unique, and practical insights have been instrumental in driving curriculum into the 21st century. Ben is a respected and sought-after member of decision making entities. His leadership within the department has ignited steady and outstanding achievement. The vision he encompasses regarding the reform of grading practices and policy led to National Schools To Watch recognition. Ben has a B.S., cum laude, in science from Grand Valley State University and an M.S. in education from Walden University. He is certified in kindergarten through eighth grade elementary education."

Sandee Coats-Haan - PAEMST 2010

Liberty Township, OH - Science

Interviewed 11/2/11

"Sandee Coats-Haan has taught for 14 years. For the past 13 years at Lakota East High School, she has taught Advanced Placement and Honors Physics, as well as science for English-language learners and special education students. She also taught mathematics at Walnut Hills High School. Sandee achieves her goal that students see physics everywhere through activities and projects.

Students are surprised that they are encouraged to play with toys in a physics class. Sometimes students build things like windmills and motors; sometimes they dissect things like disposable cameras. Sandee leads in technology. She teaches physics through a variety of software, simulations, clickers, and probeware. Her students chronicle classroom activities in a blog. She has led in-service programs on subjects as varied as classroom websites, Microsoft Excel and Word, and Internet safety. Sandee arrives 45 minutes early daily to offer help to her students. During these sessions, concepts are reinforced, and respect and relationships are built. Sandee has a bachelor's degree in Chemical Engineering from the Georgia Institute of Technology and an M.A.T. from Miami University. She is a National Board Certified Teacher and is certified in chemistry and physics. She has also worked as an engineer for Procter & Gamble."

Phil Rodney Wilson - Alabama Teacher of the Year 2011

Auburn, AL - Music

Interviewed 10/11/11

Phil Rodney Wilson, teaches music to 1st-5th graders at Ogletree Elementary School in the Auburn City School System. Wilson graduated from Troy University with a Bachelor's Degree in Music Education and earned a Master's Degree in Music Education from Auburn University. He believes that no accomplishment is

greater than knowing that after his students leave his Ogletree Elementary School classroom, they are working to make this world a better place. 'Phil Wilson is the teacher everyone wishes they had: parents, students, principals and other teachers.' said Cristen Herring, Director of Elementary Curriculum and Professional Development for Auburn City Schools. 'Mr. Wilson teaches far more than music. Whatever the lesson – Pi, insects, U.S. Presidents, state names – Mr. Wilson has a song that will connect to the curriculum.'"

Kathy Powers - Arkansas Teacher of the Year 2011

Conway, AR - Reading, Language Arts

Interviewed 10/14/11

"Powers has been teaching for 17 years and has been in the Conway Public School District since 1998. In November, she was chosen as Arkansas State Teacher of the Year. When asked what some of her most memorable moments as a teacher were, Powers said with a laugh, "Winning, for sure!" She continued, 'There aren't really any major things, it is the smaller moments that stand out; when a first grader reads on her own, and when a fifth grader thinks he can't do something, then does and realizes, 'Hey, I'm good at this.' It's the small things that add up to be great.'"

Darin Curtis- California Teacher of the Year 2011

Lakeside, CA - Physical Education

Interviewed 10/10/11

“For 18 years, Curtis has taught physical education, American history, social studies, English, and reading. “What motivates me is the challenge of identifying the students who need inspiration the most,” added Curtis. “Turning student interests into inspiration is what great teachers do. I strive to be like my father and the other teachers and coaches who took the time to inspire me. Even when an educator’s day may have come and gone, there is never an end to the good that a teacher has done.” Curtis earned a B.A. in 1991 from San Diego State University, then a M.A. in 1995. His CLAD and California Teacher of English Leaners (CTEL) certifications were earned in 2008. Curtis teaches eighth grade physical education at Tierra del Sol Middle School, Lakeside Union School District.”

Joseph Masiello - Delaware Teacher of the Year 2011

Wilmington, DE - English

Interviewed 10/6/11

“An educator for more than 26 years in the First State, Masiello joined the brand-new Cab Calloway School of the Arts in 1992. He visited every elementary school in the district to help market the new magnet school, where he has now

taught for 17 years.

'It is important to me that my students realize that they are a part of a community, not just a person in a class of 27 students,' Masiello says. "I believe it is my responsibility to provide my students with opportunities to interact with their surrounding community through many service-related activities.'"

Cheryl Conley - Florida Teacher of the Year 2011

Vero Beach, FL - Elementary

Interviewed 10/7/11

"Mrs. Conley has been teaching at Osceola Magnet School for the past three years. She began her career as a middle school teacher in Houston, Texas, where she taught for seven years before moving with her family to Florida. She has a Bachelor of Science Degree in Academic Studies, Life/Earth Science Specialization from Sam Houston State University, Huntsville, Texas. She is Science Coordinator at Osceola Magnet School, the fourth and fifth grade Science Advisor, and a member of the School Advisory Council. Her principal, Susan Roberts, describes her as "a dynamic educator, a warm and caring advocate for children, a true professional, and an outstanding representative of the teachers of Osceola Magnet School and Indian River County."

Kristen Lum Brummel - Hawaii Teacher of the Year 2011

Honolulu, HI - Elementary

Interviewed 10/19/11

“Kristen earned her bachelor’s degree in elementary education, and a master’s degree in curriculum studies from the University of Hawaii at Manoa. She has taught fourth grade at Noelani Elementary since 2006 and has been a teacher for total of seven years. This National Board Certified Teacher has introduced Noelani’s fourth graders to “A World of Discovery,” a place where students are constantly encouraged to think, ask questions, and search for answers. She uses interactive whiteboards and student response systems, an online electronic grade book for tracking student performance, production software programs to demonstrate student learning (like podcasting and iMovies), and web pages to inform and share student work with parents. In her spare time, Kristen is a mentor teacher, grade-level chairperson, guest lecturer, educational consultant, blog writer, after-school Lego Robotics instructor, and community volunteer.”

Molly Boyle - Iowa Teacher of the Year 2011

West Des Moines, IA - Elementary

Interviewed 10/18/11

“Boyle has taught in the Waukee Community School District since 2001, teaching at Walnut Hills, Prairieview and Brookview schools. During that time she has also

been an instructional coach and K-8 literacy strategist for the school district. In addition, Boyle has taught in the Des Moines, Hudson and Osage school districts. She has a Bachelor of Arts degree in Elementary Education and a Master of Arts degree in Reading Education from the University of Northern Iowa. She has done additional post-graduate studies at Viterbo University and Drake University, and has been a member of Choice Literacy and the International Reading Association."

Erika Schmelzer Webb - Kentucky Teacher of the Year 2011

Nicholasville, KY - English/Language Arts

Interviewed 10/20/11

"A nine-year teaching veteran, Erika Webb has taught English courses at East Jessamine High School throughout her career. Webb earned bachelor's and master's degrees and completed coursework for English certification at the University of Kentucky. She has also been certified by the National Board for Professional Teaching Standards (NBPTS). Webb serves as a coop- erating teacher for an Asbury University student teacher. Her most recent honors include the 2010 Campbellsville University Excellence in Teaching, 2009 East Jessamine High School Teacher of the Year and Jessamine County Schools Excellence in Education for High School Teaching awards. Webb's professional affiliations include the NBPTS, National Council for Teachers of English and the Kentucky

Association of Professional Educators."

Ryan Vernosh - Minnesota Teacher of the Year 2011

Brooklyn Park, Minnesota - Elementary

Interviewed 10/18/11

"Ryan Vernosh, a sixth-grade teacher at Maxfield Magnet Elementary School in St. Paul, has been chosen 2010 Minnesota Teacher of the Year. Vernosh says the core of his education philosophy is "an unshakable belief that all students can and will learn no matter the circumstance. Students living in poverty, students with exceptional needs, students from historically disenfranchised populations, all can and will succeed in my classroom." Many of the families in the Maxfield neighborhood live in poverty. Vernosh is passionate about culturally relevant teaching, and says the two biggest issues facing education are the achievement gap and social justice. "These gaps are unacceptable and are my driving force as I prepare to teach every day. It is my goal to continue these important conversations and share my experiences of what I and many others have done as we strive to eliminate the achievement gap and move all of our students toward excellence." Vernosh has taught at Maxfield since 2006 and in St. Paul schools since 2004. He earned his master's degree at the University of St. Thomas and his Bachelor of Arts degree from the University of Wisconsin. He is

married with one child."

Paul Anderson - Montana Teacher of the Year 2011

Bozeman, MT - Biology

Interviewed 10/7/11

"Andersen earned his degrees in biology and science education at Montana State University-Bozeman. Andersen has been posting lessons to YouTube for two years. (You can see his videos at http://www.youtube.com/bozemanbiology). Students can preview and review lessons from class at home on their own schedule. And it isn't just Bozeman High School students who are benefiting: Andersen's videos have generated over 280,000 views from around the world. Andersen not only shares his fascination with the natural world with his students, he speaks their language in terms of technology, using Facebook, texting, and YouTube as teaching tools."

Robert E. Feurer - Nebraska Teacher of the Year 2011

North Bend, NE - Science

Interviewed 10//11

Even though he's in his 32nd year as a science teacher at North Bend Central

Junior-Senior High School, Bob Feurer believes in keeping things fresh. ‘You've got to stretch. You can't do the same thing every year,’ Feurer said. ‘You've got to keep changing what you're doing in the classroom. ... Our jobs are never done as teachers. If you walk into the classroom and you can't see something that could be done better, you probably ought to quit.’”

Angie C. Miller - New Hampshire Teacher of the Year 2011

Holderness, NH - Language Arts

Interviewed 10/17/11

“Miller makes a concerted effort to create connections between her classroom and the community. She has guided students into raising money for victims of natural disasters and helped furnish an apartment for a local, low-income woman. She has created a classroom environment where students feel welcome, are eager to explore new learning experiences, and are willing to take risks. “I love coming to my job every day, said Miller. ‘Every day is unexpected–from daisies left on your desk to the kid who storms out of your classroom, angry. You never know what you’ll encounter. I love watching kids’ writing develop and I can never get sick of the image of a student so engrossed in a good book that they don’t hear you trying to interrupt.’”

Colleen M. Works - Oregon Teacher of the Year 2011

Corvallis, OR - U.S. History, Government, Sociology

Interviewed 10/7/11

“Colleen has taught a wide range of students during her career as an educator, from special needs to TAG and from 5th graders through high school seniors. From these experiences, she has learned how to differentiate instruction and employ a variety of strategies to reach students with distinct needs. Aware of the diversity in her classroom, Colleen will utilize any source, try any technique, and go to any length to ensure that ALL of her students learn, not only the curriculum, but also the skills that will prepare them for their futures both educationally and as active citizens.”

Jeffrey S. Chou - Pennsylvania Teacher of the Year 2011

Abington, PA - Elementary

Interviewed 10/25/11

“Jeffrey Chou, 35, who is in his 14th year at Highland Elementary School in the Montgomery County district, teaches his students to use Wikis (websites that can be added to by multiple users) and file-sharing in their projects, which they post in podcasts. He also has a class website with a blog that has links to articles for students to read, and he puts podcasts of difficult lessons on the site so students

can listen to them again, he said."

Susan Turnipseed - South Dakota Teacher of the Year 2011

Brookings, SD - Technology

Interviewed 10/24/11

"Susan Turnipseed, has been a teacher in the Brookings School District for the past twenty-nine years, is currently a fourth grade technology teacher at Camelot Intermediate School, where she is excited by the challenge of creating new and meaningful experiences with technology for her students in all areas of study. She sets high expectations for students, forms strong relationships with them, works hard to keep them engaged in learning, and genuinely cares about them. She believes that the education of a child is truly a collaborative venture involving teachers, students, parents, administrators, school boards, and state and local governments."

LaTonya E. Waller - Virginia Teacher of the Year 2011

Richmond, VA - Science

Interviewed 11/2/11

"2011 Virginia Teacher of the Year LaTonya E. Waller is a sixth-grade and eighth-grade science teacher at Lucille M. Brown Middle School in Richmond and

chair of the school's science department. She coaches the school's "Mind Games" team and sponsors science, engineering and forensics clubs for students. In 2009, Waller received an R.E.B. Award for Teaching Excellence. Waller holds a bachelor's degree, a master's degree and a post-master's certificate in education leadership from Virginia Commonwealth University. Waller is also the Region 1 Teacher of the Year."

Jay W. Maebori - Washington Teacher of the Year 2011

Covington, WA - Language Arts

Interviewed 10/24/11

"Maebori began his professional life as a sports journalist. Since 2001, Maebori has taught language arts to sophomores at Kentwood in the Kent School District. He is also a National Board Certified Teacher. Maebori teaches in a blended honors classroom where honors, English-language learners, special education and core students all partake of a rigorous and scholarly curriculum that he enriches with seminars and literary circles. He also teaches Kentwood's intervention courses, which target students who have already failed to meet standard on statewide assessments. Eighty percent of those students who are taught by Maebori go on to meet standard. Maebori makes his curriculum relevant to his students by tying literary themes to popular films and music. He approaches the work of educating future citizens with reverence and describes

the simple practice of listening to students as the key to success in the classroom. Maebori is also highly collaborative. He believes teachers and parents are allies, and engages the parents of his students through weekly emails. His experience observing successful sports teams as a journalist convinced him that the most effective leaders lead by example, which is a practice he now applies as a teacher."

Two participants are not listed here for default confidentiality; they can still send their bio and I'll post it, but without an already public source they aren't listed.

APPENDIX 2: Teaching Award Descriptions

Teaching Award Descriptions

All texts are taken from publicly available award sites and modified to fit profile format.

Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST)

The Presidential Award for Excellence in Mathematics and Science Teaching is awarded annually to outstanding K-12 science and mathematics teachers from across the country. The winners are selected by a panel of distinguished scientists, mathematicians, and educators following an initial selection process done at the state level. Each year the award alternates between teachers teaching kindergarten through 6th grade and those teaching 7th through 12th grades. The 2010 awardees named today teach kindergarten through 6th grade. Winners of this Presidential honor receive a $10,000 award from the National Science Foundation to be used at their discretion. They also receive an expense-paid trip to Washington, D.C., for an awards ceremony and several days of educational and celebratory events, including visits with members of Congress and the Administration.

Air Force Association Teacher of the Year Award (AFA)

The National Aerospace Teacher of the Year award recognizes classroom teachers at the national level for their accomplishments and achievements in building enthusiasm among K-12 students about science, technology, engineering and math (STEM), and preparing them to use these skills and contribute to tomorrow's technologies.

National Writing Project Profiles in Practice (NWP)

Over the past four years, the Pearson Foundation has worked with NWP sites

and instructors across the country to provide digital storytelling workshops for students and professional development sessions for teachers. Profiles in Practice are the latest Pearson Foundation/NWP resource focused on writing effectively as a foundation for and essential component of digital storytelling. The inspiration for this resource lies in the notion that replicable, engaging projects are underpinned by effective writing, revision, collaboration, and presentation strategies, and that these strands of instruction address core skill development as well as opportunities for presenting 21st century skills in an authentic fashion. Encompassing classroom-tested ideas, recommendations, and projects, as well as best practices and resources, this primer was written by teachers – five experienced teacher consultants from across the U.S. – for teachers.

Alan Shepard Technology in Education Award (AMF)

The Space Foundation, in partnership with the Astronauts Memorial Foundation (AMF) and NASA, annually presents the Alan Shepard Technology in Education Award for outstanding contributions made by K-12 educators or district-level personnel to educational technology. The award recognizes excellence in the development and application of technology in the classroom or to the professional development of teachers. The recipient demonstrates exemplary use of technology either to foster lifelong learners or to make the learning process easier. The Alan Shepard Technology in Education Award is presented annually at the National Space Symposium.

ING Unsung Heroes Award (ING)

ING Unsung Heroes began in 1995 as a way for ING to demonstrate its commitment to the education community. Grants are given to K-12 educators utilizing new teaching methods and techniques that improve learning. Each year, educators submit applications for an ING Unsung Heroes grant by describing projects they have initiated or would like to pursue. Each project is judged on its:

1) Innovative method, 2) Creativity, 3) Ability to positively influence the students. Each year, 100 finalists are selected to receive a $2,000 grant, payable to both the winning teacher and his or her school. At least one grant is awarded in each of the 50 states, provided at least one qualified application was received from each state. Winners are selected by Scholarship America, a national non-profit educational support and student aid service organization. Of the 100 finalists, three are selected for additional financial awards: $25,000 for first place; $10,000 for second place; and $5,000 for third place. The top winners are selected by ING's Educators Advisory Board, consisting of six distinguished educators from across the United States.

National State Teacher of the Year Award (TotY)

Every year, nominations are made by students, principals, teachers and administrators for the State Teacher of the Year' awards.[2] The profiles of the winners from all 50 states, the District of Columbia, American Samoa, Guam, Northern Mariana Islands, and U.S. Virgin Islands and the Department of Defense Education Activity are submitted to a selection committee made up of representatives from each of the major education organizations.[3] The committee then reviews the data for each candidate and selects four finalists. The winner is chosen from these finalists based on their biography, interview and eight essays they must submit. The award is traditionally presented by the President of the United States in the White House Rose Garden. The Teacher of the Year (TOY) Award Program was initiated in order to bring recognition to the importance of teachers as nurturers of the "American Dream."

APPENDIX 3: Recruitment E-mail contacts for the 21st Century Teaching Project

E-mail Contacts for 21st Century Teaching Project
Seann Dikkkers

PHASE 1 CONFIRMATION E-MAIL:
(Initial contact made in person)

The IRB just came in this week! In the past, I brought up the possibility of interviewing and hopefully you are still willing.

Attached is a full description of the project and consent to interview you. The nickel edition is that I'm researching the professional development 'path' that teachers traveled as the grew into using 21st century tools in their teaching practice. The goal of the study is to begin the long process of developing essentially new sorts of professional development for both new and continuing ed teachers.

Please sign the attached consent and e-mail or snail mail this back when you are able. Also, to set up a time, either note some times in the next couple weeks that work for you -or- pick from [suggested dates]

Thank you! I'm really excited to get your story as part of the data set.

PHASE 2 INVITATION E-MAIL:

Over the last two years I've been collecting stories from teachers about their journey toward the use of digital tools in the classroom. Your work as a teacher stands out! I'm writing in hopes that you and I could interview over the phone

briefly (20 minutes) as part of the 21st Century Teaching Project. A research initiative at the University of Wisconsin - Madison that will inform professional development practices nationwide.

As research lead, I would be talking to you myself and inquiring about your work, how you grew and adopted new tools, and the sources of development - both formal and informal - that inspired your work. Attached is a detailed description of the project and the question protocol for the interview if you are interested in helping. There is no incentive provided, other than contributing to the profession; and data will only be used with your consent.

Please take a moment to look over the attachments if you need. At this point, I'm simply trying to gather those that are willing. Just reply to this if you are open to an interview, and times during the work week that would be best for you this school year. I'll reply with suggested dates and contact information within a few days.

Thank you so much for your consideration! It would be my pleasure to find out more about your work.

Best,

Seann

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Alternative Intro Paragraph for TotY:

Congratulations on your recognition as a State Teacher of the Year. I am a researcher from the University of Wisconsin - Madison and I'm writing in hopes that we could interview over the phone briefly (20-30 minutes) as part of the 21st Century Teaching Project.

ROUND 2 FOLLOW UP INVITATION E-MAIL:

I'm following up on the invitation below to be part of a study on teacher growth and development. The interview is roughly 30minutes, and I hope to capture your thoughts as part of the data set; as a state TOTY, your's is a key voice in the study. I know you are terribly busy, (and that all IRB requests have the tendency to look like spam-mail), but hope you may be able to carve out time to talk between now and November.

Thank you for your consideration!

TRANSCRIPT CONFIRMATION E-MAIL:

Thanks again for the interview time. I'm happy to say the transcription is now done and your interview is attached. I had a great time talking with you - you're an amazing teacher!

In order to give you license to speak freely, you have final say over anything that used in the project. Your name will remain attached to the transcript primarily because part of the validity of the data is your status as a publicly recognized expert in teaching and learning. Other researchers could request to review these transcripts. However in the research reports, presentations, summaries, and papers written from the data base only your first name will be used with quotes to direct attention to the findings.

No response to this e-mail is needed if the transcript looks good to you. If you do have any reservations, corrections, or additions, you can respond to this e-mail

and I will make the adjustments prior to storing the data.

Finally, as the data is analyzed over the next few months, each piece will be reported in an ongoing project website for those interested in the findings. I'm putting up the initial sections explaining the study now.

All the best,

Seann

APPENDIX 4: Phase 1 Interview Protocol

Phase 1 Interview Protocol

Multiple interviews and follow up conversations both formal (below) and informal are designed here to capture the teacher's design practice, learning process, and methods for the use of digital technologies in the classroom. All questions are designed to begin conversations that the teacher can direct. Notes should include all expressions presented that detour in order to capture not the theory behind the questions, but the emergent understandings of practice the study is trying to capture on the part of the teacher.

Interview

Any and all responses should be probed for detail and clues for future questions. Follow up to get detail, the teacher's perspective, and illustrations. Encourage the teacher to teach and guide you toward doing what they do and allow for advise, tangents (in relation to digital tools and design), and problems that help illustrate not only the practice, but their personal growth and the design process.

Basic Questions

- Use transcripts of pre-interview and observation notes to follow up on any interesting points.

- Use early analysis of the pre-interview and observation to follow up on themes, threads, and patterns observed.

Review questions below from the pre-interview and relate each to the classroom observation. How did the class (both observed and designed for the year) manifest examples of each of the following?

Questions on challenges

- What challenges have you encountered along the way?
- What did you do, or are doing, to resolve them?
- How do you find out if something isn't working?
- Can you think of problems in the past that would help others trying digital out?
- How was administration involved, helpful? What advice would you give to other admin?
- Have you experienced resistance from other stakeholders? What is your perspective on that? Non-stakeholders?
- What personal challenges have you had to overcome, if any?
- Can you think of any challenges your students faced and solved?
- If you could advise on national education policy, what advise would you give?

Questions on 21st century practice

- How do you plan for class? Time? Learning activities?
- How do you organize and design for assessment? Perspectives on and about assessment? How do you know if they are learning?
- Are there specific design choices you have made that facilitate learning when you used digital technologies? Environment? Planning? Activities? Handouts? Documents? Calendars?
- What student assignments have you used? Successful? Unsuccessful?
- Are students allowed/encouraged to work together? How? How much? What

should a teacher plan for/around?

- Are there any student products that you feel exemplify powerful learning as a result of your use of digital tools? Explain?
- How do you perceive your relationship to students? What is your role?
- What might a new teacher need training in that you never had during your teacher training?
- What would you say to veteran teachers wanting to sample new tools for learning?
- Is there 'cheating' in your class? What does that look like?
- If money wasn't an issue, what would you want next?
- If space wasn't an issue, how would you design your 'classroom'?
- If time wasn't an issue, what would you do to maximize student learning?

Questions on Professional Development

- Why did you start trying new technologies as learning tools? Influence? Enthusiasm?
- What did you need to learn along the way?
- How did you seek that learning out?
- Were there 'stages' of development for you?
- What advise would you give to other teachers?
- What advise would you give to other adminstrators?
- Do students have a position of influence to encourage new practices? How?
- Do parents have a position of influence to encourage new practices? How?
- What training or learning would you want now? What's next? How do you envision getting that learning experience?

After the formal interview, inform them that you'll be doing analysis through the following year and will want to follow up with some clarification questions, record

their preferred means of communication.

APPENDIX 5: Phase 2 Interview Protocol

Interview Questions for Teachers

21CTP Form 8 Interview Protocol for R2 Teachers

Interview Protocol

Multiple interviews are designed here to capture the teacher's professional development trajectory for the use of digital technologies in the classroom. All questions are designed to begin conversations that the teacher can direct. Notes should include all expressions presented that detour in order to capture not the theory behind the questions, but the emergent understandings of practice the study is trying to capture on the part of the teacher.

Interview

Any and all responses should be probed for detail and clues for future questions. Follow up to get detail, the teacher's perspective, and illustrations. Encourage the teacher to teach and guide you toward doing what they do and allow for advise, tangents (in relation to digital tools and design), and problems that help illustrate not only the practice, but their personal growth and the design process.

Read: This interview is part of a larger study of teacher professional development

trajectories towards new media or 21st century tool use in the classroom. You have been selected because of your national recognition as an innovative practitioner. This project is an effort to capture your process of adoption of new practices. Thank you for your participation. I'm confirming you have signed the consent form and it's ok to record this interview?

Basic Questions

- What grade level and subjects do you teach?
- How long have you been teaching for?
- Would you describe your students as demographically urban, suburban, or rural?
- Is there anything unique about your teaching setting that would differentiate it from 'mainstream' public schooling?

Innovative Practice

- What practices have you been recognized for as innovative?
- In what ways do you see yourself using 21st century digital tools?
- What tools?

Themes of Adoption

- Over all, what practices or resources do you consider most influential in your professional development?
- How does your philosophy of teacher influence your PD?

READ: Now I'm going to ask you about a series of professional development practices and resources. Where do you get your ideas and passion for new practices? For each, tell me if it's "essential", "very relevant" "useful" or "not useful". If there are explanations to give for each, please feel free to add those too. If "essential", explain your thoughts. Ready?

Traditional PD

- Teacher attitude about teaching?
- Your teacher training (undergraduate work)?
- Publisher provided curriculum materials?
- Staff meetings
- Formal professional development training sessions? (out of school)
- Formal in-service days at your school?
- Colleagues in-school, teams of teachers, or professional learning communities? (face-to-face access to people).
- Face-to-face classroom continuing education experiences?
- Committee work for the school or district?

Non-traditional PD

- Colleagues out-of-school, online networks, online communications, or forums? (online access to people).
- Online video resources?
- Online data bases, idea banks, web browsing, or other online resources?
- Your relationship with your principal - formal or informal guidance?
- Your relationship with your principal – allowance for new practice?

Technology and situated experience PD

- Your relationship with your principal – provision of technology?
- Your relationship with any other school staff – provision of technology?

- Hobbies or digital gaming inspiring new ideas for class?

- Communities you are involved with because of a hobby or digital game?

- "Playing" around with a new idea, tool, or project at home?
- "Playing" around with a new idea, tool, or project in class with students?
- New technology at home.
- New technology brought into the school.

- Learning from your students about new ideas, tools, and projects?
- Learning from your students through collaborative work?
- Digital experiences, like gaming, simulations, or interface design?

All questions can be directed to project lead Seann Dikkers at sdikkers@gmail.com.