



Supporting the Professional Development of Early Childhood Teachers in Head Start: A Case of Acquiring Technology Proficiency¹

Head Start Programı Erken Çocukluk Dönemi Öğretmenlerinin Mesleki Gelişimlerinin Desteklenmesi: Teknoloji Yeterliklerinin Kazanımına Bir Örnek²

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ABSTRACT. The main purpose of this paper is to describe an exemplary professional development approach in technology learning and its outcomes for early childhood teachers in Head Start in the context of a technology project. The study utilized a collage of qualitative methods including case study, ethnography, and grounded theory. Research participants were selected using purposive sampling methods, and they include 23 people who participated in the technology project. Data collection techniques included multiple, face-to-face, telephone and focus group interviews, observations, and collection of documents and artifacts related to the technology project from the participants. NVIVO qualitative data management software was used for the analysis, and the coding procedures were applied that grounded theory offered. Findings suggest that the communities of learner model of professional development supported early childhood teachers' technology learning in Head Start. The learning curve experienced by the teachers in emotional, cognitive and behavioral dimensions indicates the importance of nature of learners and supportive learning contexts in technology learning.

Keywords. Head Start, professional development, technology proficiency, early childhood teacher, communities of learners, Preparing Tomorrow's Teachers to Use Technology Program, PT³

ÖZ. Bu çalışmanın amacı bir teknoloji projesi kapsamında öğretmenlerin teknoloji öğrenmesine yönelik örnek bir mesleki gelişim yaklaşımını ve bu yaklaşımın Head Start Programı erken çocukluk dönemi öğretmenleri için sonuçlarını betimlemektir. Araştırmada nitel yöntemlere başvurulmuş ve durum çalışması, etnografya ve temellendirilmiş kuramdan oluşan bir kolaj şeklinde yürütülmüştür. Araştırmanın katılımcılarını amaçlı örnekleme teknikleri ile seçilen 23 kişi oluşturmuştur. Veri toplama teknikleri yüz yüze görüşmeleri, telefon ve odak grup görüşmelerini, gözlemleri ve çeşitli belge ve eserlerin toplanmasını içermiştir. Veri analizinde temellendirilmiş kuramın sunduğu kodlama tekniklerine başvurulmuş ve NVIVO yazılımı kullanılmıştır. Bulgular, mesleki gelişimde öğrenme topluluğu modelinin Head Start Programındaki erken çocukluk dönemi öğretmenlerinin teknolojiyi öğrenmelerini desteklediğine işaret etmektedir. Öğretmenlerin deneyimlediği duygusal, bilişsel ve davranışsal boyutlardaki öğrenme eğrisi, teknolojiyi öğrenmede öğrenenlerin doğası ve destekleyici öğrenme ortamlarının önemini göstermektedir.

Anahtar Sözcükler: Head Start, Mesleki Gelişim, Teknoloji Yeterlikleri, Erken Çocukluk Dönemi Öğretmeni, PT³, Öğrenme Toplulukları

ÖZET

Amaç ve Önem: Teknoloji dünyadaki pek çok eğitim politikası ve reformlarının merkezinde yer almaktadır. Amerika'daki Geleceğin Öğretmenlerini Teknoloji Kullanımına Hazırlama Programı

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² Bu makale ilk yazarın "An interpretivist approach to understanding technology policy in education: Sociocultural differences between official tales of technology and local practices of early childhood educators" adlı doktora tezinden hazırlanmıştır. Araştırmanın bir kısmı Amerika Birleşik Devletleri ve Kanada'da gerçekleştirilen 2005 ve 2007 Amerikan Eğitim Araştırmaları Birliği Yıllık Toplantılarında ve Avustralya'da gerçekleştirilen 2006 CEIEC Konferansında sözlü bildiri olarak sunulmuştur.

(PT³), Teknoloji Okuryazarlığına Davet Fonları ve Teknolojik Yeniliğe Davet Hibe Programları ile Türkiye’de FATİH Projesi gibi kamu girişimleri eğitim alanındaki en büyük teknolojik yatırımlar arasında yer almaktadır. Bu girişimler eğitimde teknoloji kullanımına odaklanmakla birlikte öğretmenlerin teknoloji kullanımı konusundaki yeterlikleri hala önemli bir sorundur. Bu sorun da öğretmenlerin teknoloji kullanımı konusundaki mesleki gelişim ihtiyaçları ile ilgilidir. Öğretmenlere yönelik gerçekleştirilen pek çok mesleki gelişim modeli, geleneksel olarak yapılandırılmış hizmet içi eğitim seminerleri şeklinde sunulduğundan öğretmenlerin ihtiyaçlarına cevap verememektedir. Farklı iş koşullarında çalışan ve yetişkin öğrenenler olan öğretmenler için öğrenme toplulukları modeli alternatif bir yaklaşım olarak alanyazında tartışılmaktadır. Bu kapsamda, bu çalışmanın amacı da erken çocukluk dönemi öğretmenlerinin teknolojiyi öğrenmesinde öğrenme toplulukları yaklaşımını temel alan Öğretmenler Teknoloji Öğreniyor Projesini betimlemek ve bu projede uygulanan mesleki gelişim yaklaşımının Head Start öğretmenlerinin teknolojik yeterlikleri açısından sonuçlarını açıklamaktır.

Yöntem: Bu çalışma, Amerika Birleşik Devletleri’nde PT³ Programı tarafından desteklenen Öğretmenler Teknoloji Öğreniyor (ÖTÖ) Projesi kapsamında gerçekleştirilmiş daha kapsamlı nitel bir araştırmanın bir parçasıdır. ÖTÖ Projesi mesleki gelişim yaklaşımlarından öğrenme toplulukları modelini benimsemiş ve Ohio, Indiana ve Illinois eyaletlerindeki toplam 12 Head Start Programında çalışan ve aynı zamanda üniversiteye devam eden erken çocukluk dönemi öğretmenlerinin teknolojik yeterliklerini geliştirmeyi amaçlamıştır. ÖTÖ projesi kapsamında gerçekleştirilen bu nitel araştırma, durum çalışması, etnografya ve temellendirilmiş kuramdan oluşan bir kolaj şeklinde yürütülmüştür. Araştırmanın katılımcılarını amaçlı örnekleme tekniği ile seçilen 23 kişi oluşturmuştur. Katılımcılar arasında PT³ Programı Washington, DC ofisinde görevli üst düzey yetkililer, ÖTÖ Projesi çalışanları, Head Start öğretmenleri ve yöneticileri ve öğretmen eğitimcileri bulunmaktadır. Veri toplama teknikleri katılımcılarla gerçekleştirilen yüz yüze, telefon ve odak grup görüşmelerini, toplantılarda yapılan gözlemler ve katılımcılardan edinilen belge ve eserlerden oluşmaktadır. Veri analizinde temellendirilmiş kuramın sunduğu kodlama tekniklerine başvurulmuş ve NVIVO nitel veri analizi paket programı kullanılmıştır.

Bulgular: Amerika’da yürütülen ÖTÖ Projesi, PT³ Programı tarafından 3 yıl boyunca desteklenmiş ve Head Start kurumlarında çalışan erken çocukluk dönemi öğretmenlerinin yükseköğretime devam ettikleri süreçte ihtiyaç duyacakları teknolojik yeterlikleri kazandırmaya yönelik çalışmalar gerçekleştirmiştir. Proje, öğrenme toplulukları modelinde bir mesleki gelişim yaklaşımını yerel ve eyaletler arası oluşturduğu çeşitli ortaklıklar yoluyla hayata geçirmiştir. Hedef kitlesi Head Start programları olan bu projede, eğitimini hala sürdüren Head Start öğretmenleri için öğrenme toplulukları yaratılmasına yönelik maddi kaynak sağlanmış, yükseköğretim kurumları ile işbirliği yapmaları teşvik edilmiş ve bu programlara sosyal ve teknolojik destek sunulmuştur. Araştırma verileri, mesleki gelişimde ÖTÖ Projesinin temel aldığı öğrenme toplulukları modelinin çalışmaya katılan Head Start Programlarındaki erken çocukluk dönemi öğretmenlerinin teknolojik yeterliklerini ve bu alandaki öğrenmelerini desteklediğine işaret etmektedir. Başlangıçta teknolojiyi öğrenme konusunda korkuları, kaygıları ve dirençleri olan öğretmenlerin, kurum yöneticileri tarafından destekleyici sosyal ortamlar ve teknolojik becerilerini kullanabilecekleri anlamlı bir çerçeve sunulması ile birlikte bu korkularını yendikleri gözlenmiştir. Öğrenme toplulukları modeline paralel şekilde oluşturulan bu sosyal ortamlar, Head Start Programlarında yetişkin öğrenen olan öğretmenlere bireysel teknolojik destek sağlanması, grup dinamikleri ve etkin liderlik yaklaşımını içermektedir. Öğretmenler, proje sonrasında teknolojik yeterliklerini duygusal, bilişsel ve davranışsal boyutlarda geliştiren bir öğrenme deneyimlemişlerdir. Bu bulgular teknolojiyi öğrenmede öğrenenlerin doğası ve destekleyici öğrenme ortamlarının önemini göstermektedir.

Tartışma ve Sonuç: Bu araştırma erken çocukluk çocukluk dönemi öğretmenlerinin teknolojik yeterliklerinin geliştirilmesinde ve mesleki gelişimlerinin desteklenmesinde öğrenme toplulukları modelini kullanan ÖTÖ Projesi ve bu yaklaşımın öğretmenler için sonuçlarını betimlemiştir. Çalışma teknolojik yeterliklerin kazanımında öğrenme sürecinin sosyal doğasına ışık tutmaktadır. Araştırmaya katılan öğretmenlerin teknolojiyi öğrenme deneyimlerine yönelik bulgular alanyazındaki diğer çalışmalarla da paralellikler taşımaktadır. Öğrenme, somut yaşantılara dayalı,

anamlı, iřbirlikli, gclendirici ve baęlamla iliřkili gerekleřtięinde uygulamaları deęiřtirme potansiyeline sahip olacaktır (Darling-Hammond & McLaughlin, 1995; Lieberman, 1995; Little, 1993). Teknolojik becerilerin ęrenilmesi de sosyal bir doęada olup, baęlamdan baęımsız, doęrudan ęretim modelleri yerine yetiřkin ęrenmesine uygun, destekleyici sosyal ortamlar saęlanması ile anlamlı ęrenme mmkndr. Bu alıřmada betimlenen ęrenme toplulukları modeli ile bir taraftan yksekęretime devam eden bir taraftan da alıřan Head Start' ta grevli erken ocukluk ęretmenleri teknolojik yeterlikleri kazanmıřlar ve destekleyici bir kurum ortamında etkin liderlik uygulamaları ile teknoloji korkularını yenmiřlerdir. ęretmenlerin teknoloji konusundaki ęrenme deneyimleri duygusal, biliřsel ve davranıřsal boyutlarda gerekleřen deęiřimleri iermiř olup alanyazındaki dięer alıřmalarla benzerlikler iermektedir. (Hillesheim, 1998; Kotrlık & Redmann, 2005; Lawson, 2005; Russell, 1995; Selwyn, 2002). Bu bulgulardan hareketle, teknolojik yeterlikleri geliřtirmede sadece teknolojik altyapının ve baęlamdan baęımsız mesleki geliřim modellerinin yeterli olmadıęı, teknoloji eriřiminin ęrenenlerin zellikleri, ęrenmenin doęası ve ęrenme ortamlarını da ierecek řekilde yeniden tanımlanması gerektięi ifade edilebilir. Bu baęlamda, ęrenme topluluęu gibi sosyal baęlamı ieren alternatif mesleki geliřim modellerine teknolojik yeterliklerin kazandırılmasında bařvurulması nerilir.

INTRODUCTION

Technology has been at the center of the educational discourses since the early 1980s. The main motivation underlying this trend is the need for increased learning outcomes for students and teachers to adapt to the new demands in the information and communication era (Ward & Costello, 2016). Following the developments in the computer industry, the what, the where, the how and the why of using computers have changed in education. Becker (1991) reports that during the 1980s computers were mainly used as enrichment tools to provide variety to classroom routines. In the 1990s, systematic and regular student practice of basic skills in elementary schools' computer laboratories became more common. As the emphasis on interactivity, virtual communities and online courseware increased in schools (Gladieux & Swail, 1999) by the 2000s, educators' use of technological skills and high technology products also became important.

In light of these developments, technology has also been the central focus of many educational reforms and policies around the world. The United States, for instance, launched many technology initiatives in education since the 1990s. Among many other smaller programs, large-scale federal initiatives like the Preparing Tomorrow's Teachers to Use Technology Program (PT³), the Technology Literacy Challenge Fund and the Technology Innovation Challenge Grants are worth mentioning. Before these initiatives, the Federal Telecommunications Act established the E-Rate Program to address the telecommunications costs of schools and libraries (Cookson, 1995; McDonald, 2001). These technology initiatives funded hundreds of local projects for technology integration and training in K-12 and higher education programs. Similar initiatives appeared in Turkey as well. Through FATİH Project, students were provided tablet computers, and the schools were equipped with Interactive Smart Boards (Akaoęlu, Gms, Bellibař, & Boyerd, 2015).

In line with these investments in technology for different levels of education, the research on technology has also mushroomed. The researchers are continuing to focus on a variety of issues such as effectiveness of technology in education, multimedia applications, teacher and faculty technology training, attitudes toward technology, online learning, and the sociopolitical implications of technology (Archer et al., 2014; Damarin, 2000; İři & Demir, 2015; Kent & McNergney, 1999; Mergendoller, 2000; Ortega & Bravo, 2001; Selwyn, 2000; Thurston, Secaras, & Levin, 1996; Warschauer, 2002; Ziad, 2016). However, issues and problems related to technology still exist at all levels of education despite the extensive public spending (D'Amico, 2001; Light, 2001; Shin, 2015; Wedman & Diggs, 2001). For instance, D'Amico (2001) argues that the digital divide, inappropriate instructional use, and teacher preparation are major challenges that American schools face. Furthermore, teachers lack basic skills and they need technology support and quality software in the educational uses of technology (Barron & Goldman, 1994; Garland & Wotton, 2001; Long & Riegle, 2002); especially, early childhood teachers have greater technology anxiety in learning basic skills

(Hong & Trepanier-Street, 2004; Turbill, 2001; Wood, Willoughby, Specht, Stern-Cavalcante, & Child, 2002; Yelland, 1999).

Based on the aforementioned problems, the present paper contributes to the existing gap in the literature by focusing on early childhood teachers' professional development in technology. In fact, the majority of these problems observed in the educational uses of technology are related to the teachers' professional development. Still, many efforts toward integrating technology in education are void of educators' voices and experiences regarding their learning needs. In other words, the more emphasis appears to be on the input (hardware) and the output (student outcomes) aspects of technology integration. In this sense, the policies on reforming education should take into account the professional needs of educators to guide them in the educational uses of technology. Promising outcomes in learning through the educational integration of technology may become a reality if teachers receive appropriate support and technology training (Archer et al., 2014). With this focus on the professional development of teachers, technology integration for pedagogical purposes should follow. In line with these arguments, the present study sheds light on an alternative professional development approach in supporting early childhood teachers' technology learning and thus contributes to the empirical evidence in the literature.

What are the best ways to train teachers in the use of technology to promote better student outcomes? This question is related to the professional development needs of teachers and the nature of their learning in using technology. Teachers' different ways of learning as adult learners and the situated nature of learning in different contexts need more investigation because teachers' work contexts are diverse and their learning needs are constantly changing based on societal developments. This contextual diversity is visible across different levels of education pre-K through 12th grade. Recent studies informed by sociocultural approaches to learning also emphasize the importance of the contexts where the learning takes place (Bell, Maeng, & Binns, 2013). Taking into account the social nature of learning, this study used sociocultural theory as a lens (Berger & Luckmann, 1967; Cobb & Bowers, 1999; Gergen, 2001; Herrenkohl & Wertch, 1999; Lave & Wenger, 1991; Rogoff, 1995; Vygotsky, 1978; Wenger, 1998; Wertsch, Tulviste, & Hagstrom, 1993). Key concepts of socio-cultural perspective include culture, local agent, appropriation, social construction, situated learning, practice, mediation, and negotiation (Calderwood, 2000; Levinson & Sutton, 2001; Mantilla, 2001; Schwab, 2001). By bringing in sociocultural theory to the study of technology in education, the study highlights the social agency of teachers as they engage in complex practices in the technology learning process.

Informed by the sociocultural theory, the main purpose of this paper is to describe an exemplary professional development approach in technology learning and its outcomes for early childhood teachers in Head Start Programs. To this end, the study examines a professional development project that focused on technology learning funded by the PT³ Initiative in the United States. Before presenting the study in detail, we describe the professional development in the following sections and discuss existing approaches to the professional development efforts in education. We also present the professional development efforts in Head Start briefly to situate the study in the specific historical context.

Professional Development in Early Childhood Education

Professional development in early childhood education is not a well-defined term, and the efforts to define the term continue (Buysse, Winton, & Rous, 2009; Sheridan, Edwards, Marvin & Knoche, 2009). It broadly refers to systematic attempts to support educators' practices and ongoing learning as they continue to work with children of different ages in different subject areas. Similarly, The National Professional Development Center on Inclusion (NPDCI) defines professional development as "facilitated teaching and learning experiences that are transactional and designed to support the acquisition of professional knowledge, skills, and dispositions as well as the application of this knowledge in practice" (Buysse et al., 2009, p.239). Early childhood education is a special field in which teachers need to demonstrate a wide range of core skills and knowledge to support children's learning and development. When the structure of professional development consists of a coherent and systematic program, responsive to diverse needs of individuals, it contributes to teachers' self-esteem and provides them opportunities for application and reflection. This

framework for early childhood professional development, called “career lattice,” suggests a common knowledge base or core themes distinguishing the early childhood education from other fields (NAEYC, 1993). According to the National Association for the Education of Young Children, the professional knowledge base in early childhood contains a variety of areas. These include “demonstration and application of child development principles, observation and assessment skills, creation of appropriate environments for children, planning and implementing developmentally appropriate curriculum; establishment of supportive and positive relationships with children and families; understanding of the role of family, culture, and societal context in learning and development; and, an understanding of professionalism in early childhood” (NAEYC, 1993, pp. 5-6). An added dimension to this core knowledge is the development of technology skills and knowledge of developmentally appropriate uses of technology with children in today’s world. In the joint position statement with the Fred Rogers Center, NAEYC suggests, “Early childhood educators need training, professional development opportunities, and examples of successful practice to develop the technology and media knowledge, skills, and experience” (NAEYC, 2012, p.10). To support such a comprehensive knowledge base in early childhood education, teachers need relevant and continuous professional development opportunities.

There are several approaches to professional development ranging from traditional workshops to newer distance learning environments. To name a few, Martinez-Beck and Zaslow (2006) identify five forms of professional development efforts. These include formal education, credentialing, in-service training, coaching/consultation, and communities of practice (Cited in Sheridan et al., 2009). In a similar vein, Kennedy (2005) identifies nine models of professional development, each suitable for different contexts. These models include training, cascade, award bearing, deficit, standards-based, coaching/mentoring, community of practice, action research, and transformative model. Kennedy’s models range along a continuum from traditional and transitional to transformational approaches. Several of these approaches to professional development continue to coexist, and some appear to support teachers’ learning better than many other.

Although empirical research on professional development approaches is limited (Sheridan et al., 2009) there appears to be an increasing consensus on the ineffective aspects of professional development programs. Traditional professional development programs do not appear to meet the learning needs of teachers (Jenlink & Kinnucan-Welsch, 2001). These programs usually take the form of ‘one-shot’ training seminars on different topics for teachers. They are usually inadequate, entry-level and uncoordinated. According to McCotter (2001), professional development is often hierarchical, and it is unlikely to be beneficial since “it is done to or for teachers, rather than by or with them” (p.701). Another critique is that “staff development often is seen as bringing in outside ‘experts’ to provide training for teachers” (Post & Lubeck, 2000, p.282). As those critics reveal, effective professional development emphasizes the importance of the social and emotional aspects of learning in context for teachers in the form of support, collaboration, diversity of the needs, and practical experiences. If the professional development is experience-based, ongoing, relating to theory and practice, contextual, collaborative, and empowering, it can effect change in practice (Darling-Hammond & McLaughlin, 1995; Lieberman, 1995; Little, 1993). Support and collegiality also enhance the continuous professional development of teachers (McCotter, 2001; Thomas, Wineburg, Grossman, Myhre, & Woolworth, 1998; VanderVen, 1994). These positive aspects of professional learning are available in the community approaches to professional development in education (i.e. communities of practice, communities of learners) and embody the social features suited to meet the diverse needs of early childhood teachers in various contexts.

The Community Approaches to Professional Development

The community is a social unit that brings a diverse group of people together around certain individual or collective goals based on a web of social relationships. Sergiovanni (1999) defines community as a social organization, organized around relationships and ideas. “They create social structures that bond people together in a oneness and that binds them to a set of shared values and ideas” (p.15). Community building as a related concept identifies learning in education as a transformational practice involving all participants (Retallick, 1999). With respect to leadership, the care and nurture of the whole school community are at the center of a shared leadership between all

school staff (Fyson, 1999; Sergiovanni, 1999). Another dimension of community in schools is the partnership between schools and higher education institutions (Ball, 2002). Grundy (1999) sees partnership at the heart of community approaches and proposes changes in the organizational structure of institutions to create learning communities.

The theoretical basis of professional development efforts that use the concept of the community originates from Lave and Wenger's (1991) ideas on communities of practice. "Over time this collective learning results in practices that reflect both the pursuit of our enterprises and the attendant social relations. These practices thus become the property of a kind of community created over time by the sustained pursuit of a shared enterprise" (Wenger, 1998, p.45). In this line, the definition of communities of practice includes flexibly structured professional groups exchanging ideas in the context of social relationships, support and apprenticeship model of learning. Furthermore, "communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002, p.4). The learning in this model occurs in the form of participation in the community. According to Wenger (1998), communities of practice models promote sustained professional development via building the capacity of agencies and establishing support networks and internal sources (Cited in Sheridan et al., 2009). The support networks are not limited to internal sources; rather communities of practice receive support from outside sources (Helleve, 2009).

The concept of a learning community is similar to the community of practice concept. According to Shapiro and Levine (1999), learning communities share basic characteristics of bringing small groups of students and faculty together, integrating curriculum, establishing support groups, socializing students into the expectations of college, bringing faculty together in meaningful ways, focusing on learning outcomes, providing a setting for academic support and offering a critical lens for examining school experience. These aspects of communities of practice in education reinforce the idea that community models of professional development offer a context-friendly learning approach for teachers. Indeed, different early childhood programs have adopted these forms of professional development (Sheridan et al., 2009). However, the outcomes of the community models of professional development for early childhood teachers in learning technology skills are not very well known. This study sheds light on the outcomes of using the communities of learner model for the professional development and learning outcomes for Head Start teachers.

Professional Development in Head Start

Head Start is a federally funded preschool program serving a multicultural population, with the involvement of families in children's early education and a variety of other social services and activities mandated by federal guidelines (Zigler & Muenchow, 1992). It was established as a part of President Lyndon Johnson's "War on Poverty Initiative" in 1965. The goals of Head Start included the provision of educational services, health services, social services, and parent involvement (Lubeck, deVries, Nicholson, & Post, 1997). The program has also provided career opportunities for parents by encouraging their involvement as volunteers and paid employees in Head Start classrooms. The program employed many college-trained teachers, but many parents were hired as staff members, based on their experiences of working with children and observations of them in the classroom interacting with children. Given its size nationally, there was a constant need for experienced early childhood teachers to increase the quality and to close the gaps between programs nationwide (Zigler & Muenchow, 1992). The program has taken many steps to improve and control the quality in programs. In its early years, professional development activities mostly included in-service training workshops and teacher-teacher aid teamwork (Payne, 1973; Zigler & Muenchow, 1992). Later, the program moved to credentialing by establishing the Child Development Associate credential (CDA) for early childhood teachers (Hamby, 1975; Washington & Bailey, 1995; Zigler & Muenchow, 1992). Establishing a credentialing system enabled Head Start teachers to follow a career path in early childhood education. In subsequent years, the program mandated earning a 2-year (AA) and 4-year degree (BA) in early childhood education or a related field. The Teachers Learning

Technology (TLT) Project¹ described in this study took place in the context of professional development mandates in Head Start agencies. The TLT Project supported early childhood teachers' technology proficiency in twelve Head Start agencies via the communities of learners approach.

The Contextual Background of the Research

The U.S. Department of Education launched the PT³ Initiative in 1999 to transform teacher education and prepare technology-proficient future teachers. The goals of the PT³ Initiative included 1) Improving the knowledge and ability of future teachers to use technology in improved teaching practices and student learning opportunities, 2) Improving the quality of teacher preparation programs, and 3) Addressing the digital divide. Since its first inception in 1999, the PT³ provided \$275 million funding over 440 consortia that focused on faculty development, course redesign, certification policy changes, online teacher preparation, virtual education environments, video case studies, electronic portfolios, mentoring and assessment strategies. The PT³ Initiative provided a three-year, catalyst grant to a consortium of seven organizations and institutions at a Midwestern University² in Ohio: The Teachers Learning Technology Project (TLT). The TLT Project proposed to improve the quality of teacher education programs by supporting twelve Head Start agencies, using a 'community of learners' professional development model for early childhood teachers. The Project proposal titled, "Communities of Learners: Alternative Career Pathways for Pre-K to Grade 3 Teachers", was collaboratively prepared by a team of professional staff at the Research Center of the Midwestern University and two early childhood faculty advisors from the College of Education at the same university. The TLT Project proposal team responded to the PT³ Initiative's goal of preparing technology-proficient future teachers in conjunction with the 1998 Head Start Reauthorization mandate that 50 percent of early childhood teachers in center-based Head Start programs would earn a two-year or four-year degree by September 2003. The TLT Project was awarded approximately 2 million dollars for the period between 1999 and 2002. The proposal team predicted that those Head Start teachers who pursued degrees in education would develop their technology skills and then the local K-12 Schools would recruit them as "home-grown" technology-proficient teachers.

METHODS

This study is a part of a larger qualitative research that employed an eclectic and interpretive approach. The research utilized a collage of methods including case study, ethnography, and grounded theory (Erickson, 1986; Glaser & Strauss, 1967; Marcus, 1998; Zaharlick, 1992). According to Merriam (1998), case studies are thick and contextual descriptions of a particular situation, event or program that illuminate a phenomenon or discover unique meanings as to the complex relationships among wide ranges of variables. Ethnography is the study of diverse groups of people, organizations or institutions through prolonged engagement with a focus on "culture," "the acquired knowledge that people use to interpret experience and generate social behavior" (Spradley, 1979, p.5). This qualitative study employed an ethnographic case study design because the TLT Project had a specific focus on early childhood educators' technology learning unlike most of the other funded PT³ projects nationwide, and the institutional contexts of the technology integration initiative were unique in the cultural sense.

The research participants were selected based on purposive sampling to obtain rich information for the study (Patton, 1990). Of the twelve Head Start Agencies that the TLT Project supported, two agencies were selected as information-rich cases for this study. The agencies that participated in the research were Flint County (FC) and Cameron County (CC) Head Start Agencies³. There were 23 participants from different contexts in the original research. These included 2 key informants from the PT³ Office in Washington D.C. (the federal layer); 8 people from the TLT Project in Columbus, Ohio (the higher education layer); 3 administrative staff, 8 early childhood teachers and 2 faculty partners from Flint and Cameron County Head Start Agencies in Cincinnati, Ohio and New

¹ The name of the project is a pseudonym.

² The name of the university is a pseudonym.

³ The organization names are pseudonyms.

Albany, Indiana (Four teachers and one faculty partners from each agency). The informants from the PT³ Office were in administrative positions and they were contacted via telephone. The researcher had access to the TLT Project staff via her former employment as a research assistant; therefore, her existing professional relationships supported her entry to the field. The participants from the TLT Project volunteered to participate and provided the necessary documents for the study. Early childhood teachers and administrators in these two Head Start agencies were also invited to participate in the study based on the recommendations of the TLT Project staff as to their capacity to provide rich information. All of those who volunteered to participate in the study were selected as the study participants. Head Start Agencies were first contacted via telephone and after receiving their verbal consent, they were visited on site on different occasions to conduct the interviews and observations in the meetings.

The data collection included multiple, semi-structured face-to-face interviews, telephone interviews, a focus group interview, observations and field notes, and various organizational documents and artifacts from the technology project. A total of 23 face-to-face interviews, 1 focus group interview, and 5 telephone interviews were conducted in the study. Each interview was audio-recorded, and they lasted between forty minutes to two hours. The interview questions were prepared based on field notes taken during observations in the monthly meetings, the research questions, and thorough readings of TLT project documents. The interviews included several questions related to the process and experiences of participating in the technology project, and the questions in each interview were tailored according to the participant groups (i.e., teacher, faculty member, and the TLT Project staff). In addition to conducting these interviews, the researcher attended five staff meetings, each meeting lasting three hours in the TLT context and four teacher meetings, each meeting lasting two hours in two Head Start agencies in Indiana and Ohio. The documents used include the TLT project proposal, the Head Start grant application proposals and documents sent to TLT project, staff meeting minutes, the TLT Project website, the PT³ website, the PT³ application guidelines and the researcher journals.

Some artifacts of the project were also obtained for the study that the TLT staff produced in three years. These artifacts included two conference videotapes, a toolkit, a CD, promotional videos and recorded meetings. This paper utilized data sources specifically related to the Head Start agencies and the TLT Project to describe the professional development approach for early childhood teachers' technology learning. These data sources included face-to-face, semi-structured interviews, focus group interview, participant observations and some of the project documents.

NVIVO qualitative data management software was used for the analysis based on the coding procedures from grounded theory- open coding, axial coding, and selective coding (Erickson, 1986; Glaser & Strauss, 1967, 2001). Coding is an interpretive process of searching data for regularities, patterns, themes, and topics (Corbin, 1986). For the analysis of the data, the researcher first transcribed the records and then created analytical case summaries to prepare for coding. At this stage, printed copies of data were read; a sample was drawn from the clusters of the data unit to create a list of codes, and then these codes were applied to the rest of the data using NVIVO. The analytical transcription case summaries and initial codes created during transcription and the study participants' constructs informed the coding process. Wherever possible, participants' exact words were used to describe the data in the analytical narratives. Trustworthiness of the study was established through triangulating the data sources and perspectives of different research participants, systematic analysis of the data, the researcher journal, member check and reflexive practices (Patton, 1990).

As for the ethics and the researcher's role, routine ethical procedures were followed to protect the study participants' rights. Before data collection, the researcher informed the study participants about the purpose of the study, the type and length of the procedures, the nature of their participation, the confidentiality of the data gathered, and their rights to withdraw from the study anytime. The researcher also debriefed the participants about the purpose of the study and the procedures just before the interviews. The researcher received both written and verbal consent from all participants in the study. To ensure anonymity, the researcher assigned pseudonyms or numbers for participants' names, and changed the project, organization and institution names.

The researcher worked as a research assistant during the first three years of the TLT Project. This prior experience helped the researcher to build rapport with the participants during the data collection. However, the researcher's role is not limited to the data collection process. The researcher, as the author of the research report, can represent study participants in a variety of ways. Through continuous reflection on her own status, the researcher acknowledged the research as a process of moral reasoning and recognized the researcher's responsibility as being ethical before, during, and after the study. The researcher took the ethical responsibility to tell the story of study participants accurately without "othering" or silencing the voices of people involved and presented the findings without privileging any one context or participant over another (Fine, Weis, Weseen & Wong, 2000).

RESULTS

The results include a description of the professional development approach in the TLT Project and Head Start teachers' technology learning experiences in the TLT Project. The specific findings are based on the project documents and artifacts and various participants' accounts from the interviews. The researcher's observations during the meetings and her former employment in the TLT Project also informed the findings. The researcher's assertions regarding the findings were supported by different participants' accounts and several documents. Some of the exemplary accounts illustrating participants' points of view and experiences are provided as empirical evidence for the claims made by the researcher. The words or sentences shown in italic are examples of participants' expressions and they were used to create the main themes found in the study.

The Professional Development Approach in the Teachers Learning Technology Project

The TLT Project website stated the purpose of the project as "*to improve the quality of early childhood teacher education programs by enhancing Head Start teachers' academic opportunities through increased exposure to and use of technology in authentic and culturally relevant contexts*"¹ as the teachers pursued their teaching credentials mandated by the Head Start Reauthorization of 1998. Building on a "*Communities of Learners*" professional development model for early childhood teachers in Head Start, the TLT Project stated four goals in the PT³ grant application²:

- 1) Create social and technological supports for diverse, nontraditional learners;
- 2) Guide pre-service teachers to technological proficiency by creating authentic contexts for using technology;
- 3) Create distance learning content focused on the development of best practices for teaching and learning; and
- 4) Create a culturally responsive context for the education of pre-K to grade 3 pre-service teachers.

The following excerpt from the proposal shows how the project was planning to achieve those goals in teacher education context:

The goal of the Federal "Preparing Tomorrow's Teachers" project is to create a catalyst for preparing technology-proficient teachers to serve low-income urban and rural communities. A Teachers Learning Technology (TLT) consortium of seven partners, with the Midwestern University as the lead organization, proposes to meet this goal by creating "Communities of Learners" (COLs). Twelve COLs³ in Ohio, Indiana, and Illinois will model alternative pathways for teacher education in urban and rural low-income communities and will prepare technology-proficient teachers. The following combination of factors will create technology-proficient teachers: Immersion in cutting-edge technology; receiving individualized and "just-in-time" technology assistance and support; using technology in an authentic context; making technology applicable to both their own learning and that of their children and families.

As these excerpts show, the prominent theme in the project proposal is "*to support teachers in becoming technology-proficient.*" The TLT project emphasized the concept of support and use of the community of learner model, with a strong technological infrastructure and relationships leveraged from diverse and committed partners. The TLT Project was based on two assumptions: 1) Each Head Start agency as an autonomous COL would develop relationships with multiple partners and create supportive contexts for the teachers who were pursuing their degrees; and 2) The faculty partners

¹ The excerpts are taken from the TLT Project website but the citation is not provided to protect the identity of the research participants.

² Communities of Learners: Alternative Career Pathways for Pre-K to Grade 3 Teachers

³ Each Head Start agency would adopt the communities of learners model of professional development.

were proficient in technology skills, and they would support Head Start teachers to meet the goal of technology proficiency. One member of the proposal team commented on the purpose of using COLs as a model and said, “*It was intended to allow each group to construct its own identity....so we kept saying we’ll sit there and let the 12 gardens grow rather than create 12 pre-planned, pre-designed identical gardens*” (Focus Group Interview).

As the excerpt above delineates, the specific role of TLT Project in supporting teachers’ professional development through school and technology use is indirect since it regards and respects Head Start agencies as autonomous, engaged and willing participants. Therefore, the Head Start agencies would directly support teachers’ professional development, while the TLT Project would serve as a “*hub of information*” for them. In describing the kind of support the TLT Project would provide, the TLT Project Coordinator said the following:

They knew they could call us if they had a question. For example, with their equipment money they bought some computers, they bought a printer or whatever and they had a problem with it. Yeah, they could call the vendor, but they could also call Tony (one of the TLT staff members), and literally emailing him or calling and get an answer in usually within an hour or two and that was huge with agencies. They knew that we were that backbone for them. I think also support, sort of the administrative support that Jim and I provided, in terms of like helping them to think through goals like action planning, establishing partnerships and learning about resources and knowing how our partners can help them. (Heather, Interview 3)

As the excerpt suggests, the project was constructed as an “*information hub*” for the unique paths that Head Start agencies would create on their own. In this sense, the project staff would be “*hand holding*” Head Start agencies as they created supportive contexts for the teachers with the help of their partners. While the project served as a hub of information, they would draw resources from the seven partners where needed. Figure 1 shows the “*main players*” of the TLT Project and how these players were linked to each other in reaching the project goals.

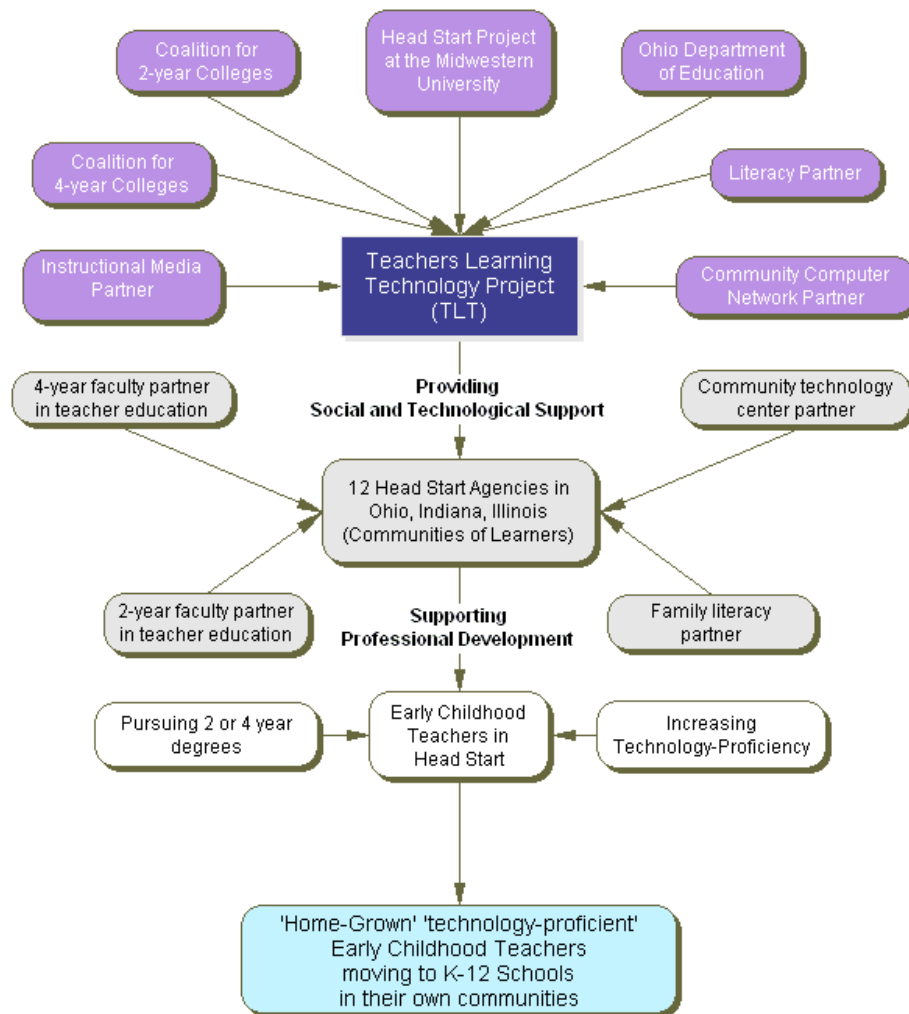


Figure 1. *The Teachers Learning Technology Project*

Having partners was the main request in the PT³ Initiative’s call for proposals; therefore, the TLT Project established a strong network of partnerships in its implementation process. The TLT Project had seven partners: the Head Start Project (PDNET) of the Midwestern University, two associations representing two-year and four-year colleges, an instructional media partner, a literacy partner, the Ohio Department of Education and a non-profit community computer centers partner. The power of partnership was also distributed to the Head Start agencies from the very beginning of the technology project. By replicating the PT³ Initiative’s requirement, the TLT project asked the 12 Head Start agencies to have partners from teacher education institutions, community technology centers, and family literacy partners. Upon receiving the funding notification from the PT³, the TLT Project started to recruit full-time and part-time staff and publicized the TLT project among the Head Start agencies in Indiana, Illinois, and Ohio. The TLT Project disseminated a request for project proposal to fund Head Start agencies for a three-year period. Sixteen Head Start agencies applied to the TLT Project’s call. After receiving proposals from the Head Start agencies in three states, the TLT Project formed a proposal review panel, and 12 Head Start agencies in Indiana, Illinois, and Ohio received funding. The TLT Project requested a cohort list of “*diverse non-traditional learners*” from Head Start agencies. These teachers were expected to pursue a degree and become technology-proficient, while agencies in collaboration with the faculty partners would support their professional development by providing authentic contexts for technology learning.

The TLT Project had received funding for three years and an extra year extension until the end of 2002 because of remaining project funds. During this period, the researcher worked as a research assistant at the TLT Project. As the observations had shown during and after the project, the TLT staff provided several forms of support to the early childhood teachers and Head Start agencies via various activities. The TLT Project staff held four annual meetings with the Head Start agencies and faculty

partners, conducted over 70 site visits and attended teacher meetings at the agencies, provided 100 individualized technology training to 24 faculty partners of Head Start agencies and held three video conferencing sessions with the Head Start agencies. In this process, early childhood teachers in 12 Head Start agencies who pursued their AA or BA degrees developed their technology skills via the communities of learner approach that the TLT Project promoted.

In sum, various activities and artifacts of the technology project show that the TLT used and promoted the tools of communities of learners approach to the professional development in several ways with the Head Start agencies. In this sense, the idea of partnership, the autonomy of social actors, relevant support in social and technical matters and creation of a climate conducive to learning technology were main characteristics underlying the specific professional development approach. The following section includes a detailed description regarding the outcomes of the communities of learner model of professional development for early childhood teachers who were learning to be proficient in technology. In this framework, we describe the two Head Start agencies' response to the technology project and the learning experiences of early childhood teachers in these agencies.

Head Start Agencies' Response to the Teachers Learning Technology Project

The TLT Project had worked with 12 Head Start Agencies to support early childhood teachers to become technology proficient. While each agency had different responses to the requirements of the TLT Project, they all focused on the professional development of early childhood teachers who were trying to become proficient in technology while they pursued an advanced degree as nontraditional learners. These teachers were identified as nontraditional learners because they were adults, older than typical college students were and were enrolled in school as they worked. The communities of learner model in the professional development of these teachers as nontraditional learners were applied in the context of their participation in the technology project. The descriptions of the two cases (Flint County and Cameron County Head Start) illustrate how this model was implemented and what the outcomes of the professional development approach were for early childhood teachers working in low-income communities.

The Flint County Head Start program is located in a small town in southern Indiana. The town has both rural and urban characteristics due to its unique location at the border of Kentucky. The agency receives federal funding to provide services for 276 children, ages three through five. The agency offers half-day services to 199 children Monday through Thursday, between 9:00 am and 1:30 pm as well as extended day services to 57 children Monday through Friday between 6:30 am and 6:00 pm. In addition, 20 children receive Head Start services through a partnering childcare center. The agency has 15 classrooms in six centers, spread out to serve a single county. Cameron County Head Start is a large agency, located in Cincinnati, Ohio and serving 18 counties outside the downtown area. The agency receives both federal and state funding to provide Head Start services for 1500 children in 40 classrooms. One hundred fifty employees, including the family advocates, administrative staff, and 80 teachers work in the agency. Cameron County Head Start offers four different programs: half-day and full day center-based services, home-based education through home visitors, full day services through partnership centers, and family childcare through in-home providers. In addition, the agency received funding for a bilingual Early Head Start Program in 2002. While the agency serves a diverse population throughout 18 counties, these counties are segregated depending on where they are located geographically.

Flint County and Cameron County Head Start Agencies both formed communities of learners and held cohort meetings to support teachers' professional development. They built on-site computer labs in their agency for teachers and parents, and each agency had a unique response to the TLT Project. Flint County Head Start was a small agency whose lack of access to technology was a major challenge for teachers to comply with the Head Start Reauthorization requirements. The Agency Director described the agency as a "*family-oriented*" organization where they encourage learning at all levels and celebrate individual successes whenever they occur. The agency "*brings staff, community, and families together to promote education, wellness and self-sufficiency.*" During the researcher's three visits to the Flint County Head Start, the close-knit relations among teachers and administrative staff were also noted. The Agency Director emphasized access to technology because

the majority of the teachers have not been in college environment as adult learners, and they did not have a computer and basic knowledge of computers. The Agency Director, Julie explained her initial thoughts about the project in the following: *"When we look at it, we thought, you know, it can't hurt to apply because we have no computers available for teachers. We have none in the classrooms, and we had no general public access, use for teachers, and we thought, "Well, it's a chance to take"* (Julie, Interview 2). In the interview for the TLT Videotape (a TLT Document), the Agency Director shared her enthusiasm:

We were very excited when we had the opportunity and found that we'd gotten the grant. We knew that this was going to be a life change for many people here. We had people that had literally never touched a computer, had never turned one on, and were afraid they'd break it if they did turn it on. So we knew it was going to be a big change for lots of folks, and we were very excited about it. (Julie, TLT Video)

The second agency, Cameron County Head Start is a unique agency in its readiness for change and organizational foresight that constituted the basic ingredients for a thriving agency. These features suggest that this organization is a *leadership agency*. Similar to Flint County, Cameron County Head Start's participation in the project was built on its existing investment in teachers' education in compliance with the State's educational requirement (similar to Head Start Reauthorization) and their need to improve the technological infrastructure in the agency. Below, the Agency Director Sally describes the fit of the grant with their ongoing work at the time:

I think being able to be part of the grant was just a bonus on top of what we were already doing. Because I don't think, we would have been able to integrate as much as the technology piece and that would have probably caused some failure in our cohort going to school. Because if they haven't gotten the technology part, I think we would have more people dropped out, it would have been more stressful for them. (Sally, Interview 1)

Thus, the TLT project's emphasis on professional development of teachers through education and exposure to technology in the context of Head Start Reauthorization did not require the agency to follow a different path and create new routines; rather, it paved a route fitted to existing technology needs within the agency.

Upon receiving funding for the project, both agencies held a meeting with the cohort of early childhood teachers and explained their agency's expectation for teachers' participation in the TLT Project. The reactions of teachers differed, based on their status of enrollment in college-level work to meet the professional development requirements in Head Start. The first group of teachers included those who were not yet enrolled in school and the second group of teachers was those who were already seeking a degree. The majority of cohort members in Flint County were from the first group. The cohort meetings created a sense of tension and anxiety among those teachers who had not enrolled in school yet. The excitement for the project translated into a range of emotional, cognitive, and behavioral displays of reactions including fear, reluctance, and indifference among some teachers in both Flint and Cameron County Head Start Agencies. The Cameron County Curriculum Coordinator shared her observations and said, *"I have to say that the first couple of classes they took in the technology, they were frustrated with it, you know, and [they would say] what are you trying to do? Do I need it?"* (Sally, Archived Interview, TLT Document). During the interviews in both agencies, these teachers also shared their initial reactions and said that they were afraid of failure; they did not feel *"smart enough;"* and learning technology was *"one more job."*

Teachers who were already pursuing a degree did not have as apprehensive reactions to the project as the first group did. The project for this group of cohort members was a *"grant"* that *"they"* [agency administration] were doing. Therefore, they seemed to have an indifferent attitude toward the project and did not seem to be fully conscious of what their participation in the project would mean for them. The Cameron County Curriculum Coordinator said, *"I think it took them a while to understand what we were really trying to do... So, we've just been trying to give them information about the grant and explain you know, 'this is coming from the grant;' 'this is why we are doing it'"* (Sally, Archived Interview, TLT Document). Likewise, one of the teachers said, *"We just learned it as a grant; it was almost like a mystery to me. It was just a grant, I mean until maybe last year...I didn't really*

realize what impact they really have until I had more personal involvement with it” (CC, Teacher 6, Interview).

The emotional responses of teachers in both groups were closely related to their lived experiences as “non-traditional learners” in Head Start context. These teachers had both family and work responsibilities; their age was beyond the age of traditional college students, and they have not been in school for a very long time. The teachers in both agencies were involved in Head Start in various roles. The majority of them were former Head Start parents, now working as teachers in Head Start. Given the low salary range of teachers in Head Start, they have significant economic barriers in pursuing a degree. For these reasons, going back to school, as they put it, was a “struggle” for these teachers and they had to “sacrifice” many things that they prioritized in their lives. For instance, one of the Cameron County teachers said, “You’ve really been out school for a long time like I have; it’s a struggle to go back and when you don’t have that support; it’s hard, even at home. If they don’t have the support at home, that hurts and it’s a struggle for a lot of us” (CC, Teacher 5, Interview). As teachers struggled to meet challenges and made sacrifices to balance multiple roles and expectations, they drew needed support from their agencies’ resources.

Flint and Cameron County Head Start agencies supported their degree-seeking early childhood teachers and non-traditional learners’ professional development in technology in similar ways for three years. These included early release to attend college classes, flexible computer lab hours, payment for books and tuition, helping teachers in scholarship applications, inviting faculty partners to their COL meetings, assistance in writing term papers, individual training on computers, and establishment of routines through which teachers could share their experiences and building a support network during the project. The support structure in both agencies utilized the communities of learners approach in the professional development of early childhood teachers’ technology learning. In the end, the teachers in both agencies had culturally unique experiences in the TLT Project. In Flint County Head Start, teachers at first observed the environment as “voyeurs” and then they participated in learning as a social activity. In Cameron County Head Start, teachers were reluctant about formal training; therefore, instances of “co-operative learning” with peers and family members became more pronounced.

Head Start Teachers Caught the Technology Bug

The early childhood teachers working in Head Start differ from typical teacher profiles in many respects. The teachers in Flint and Cameron County were involved in Head Start in various roles. The majority of them were former Head Start parents, now working as teachers in Head Start. Given the low salary range of teachers in Head Start, they have significant economic barriers in pursuing a degree. For these reasons, going back to school, as they put it, was a “struggle” for these teachers and they had to “sacrifice” many things that they prioritized in their lives. For instance, a teacher from Flint County said, “I had to sacrifice a little bit you know when the kids are in bed and that” (FC, Teacher 4, Interview). The following table summarizes the demographic features of the Head Start teachers participated in the study. The information was obtained during the interviews from the teachers. The first four teachers in the table were working at the Flint County and the last four teachers were working at the Cameron County Head Start Agency. All of these teachers were pursuing a two-year degree and were planning to continue their education for a four-year degree at the time of the study.

Table 1. Demographic features of teacher participants

Name/Work Title	In Head Start	Professional Experience	Personal Information
Teacher 1 Lead teacher	12 years	Parent volunteer, substitute teacher, teacher-bus driver	Married, two teenage sons, Head Start parent
Teacher 2 Lead teacher	8 years	Parent volunteer, teacher-bus driver, public school teaching	Married, six children (10 to 18 years old), Head Start parent
Teacher 3 Lead teacher	17 years	Home visitor, evening preschool program	Married 28 years, one son
Teacher 4 Assistant teacher	4 years	Daycare teacher	Married, two daughters (8 and 16 years old)

Teacher 5 Assistant teacher	10 years	Health and nutrition assistant, preschool teaching	Separated, two children Head Start parent
Teacher 6 Lead teacher	10 years	Parent volunteer	Married, three sons, Head Start parent
Teacher 7 Assistant teacher	4 years	Assistant teacher, parent volunteer, community action agency	Seven sons, 16 grand children Head Start parent
Teacher 8 Lead teacher	7 years	Assistant teacher, preschool teacher	Married, two children (17 and 22 years old)

Given these diverse demographic features, the Head Start teachers' experiences with technology and proficiency in using technological tools were also limited. The teachers' early accounts in Flint County and Cameron County Head Start Agencies revealed a fear of technology and experiences of struggle and challenge to learn computer skills¹. Their fear of technology was linked to a variety of reasons including the novel nature of technology, lack of basic computer knowledge, and generational differences. Their confusion was also evident in the technology assessment surveys that they filled out at the beginning of the TLT project, which showed that they were self-rated "novice" learners of technology and therefore did not have the basic skills to be comfortable with technology. One of the teachers said, "*It was difficult trying to remember just all the different set ups. Just trying to research using the Internet was a little confusing; had different websites*" (FC, Teacher 4, Interview). Another teacher said, "*It was frustrating. I just never could figure it out. I don't know how to explain that. I felt like I got lost on it; I would get somewhere, I wouldn't know where to go or how to get there or how to get out of it*" (CC, Teacher 7, Interview). She also added that it was still difficult, but she "*took the challenge.*" In both agencies, teachers relied on different means of social support to learn technology. Their initial fears and reluctance disappeared, as they became more experienced technology users, both academically and personally.

The Head Start teachers' experiences with and exposure to technology indicated a multidimensional change for teachers in the both contexts. According to the Flint County Director, learning technology provided a boost in self-confidence for teachers. The Director said,

It led them to come up to a point where they felt like they were able to use technology. It was accessible to them. Also, it gave them a feeling of achievement that they were becoming better teachers and they were more in step with the current trends toward technology (Julie, Interview 2).

Those teachers who "*had no clue, about just using like the bold, italic, were helping each other; learning it, doing it; they didn't even realize it.*" In addition, every job description in the Flint County Head Start Agency started to include the goal of improving technology skills. Thus, both new and ongoing employees learn to use computers in the context of their daily work. As the Agency Director described, there is "*no more technophobia*" among the teachers and "*everybody, kind of, caught the technology bug in the agency.*" These observations and teachers' accounts reveal that learning to use technology via the communities of learners approach involved changes in three overlapping dimensions. These included emotional, cognitive, and behavioral changes.

The *emotional and cognitive change* is evidenced by teachers' increased technology skills along with their changing attitude and perceptions about technology. One of the teachers said, "*It's just time-saving, you know, it really helps us with the assessment and things like that, so much easier, and with the way the world is today, everything is technology, so it's just really helped us as teachers and personally in our own lives and do, I guess a better job or be more successful*" (FC, Teacher 4, Interview). Another teacher said, "*It is helping me make it through school, teaching the children in my classroom more about computers, teaching my children at home*" (CC, Teacher 6, Interview). As these excerpts show, these teachers have passed the technophobia stage and have become comfortable, excited, and confident. Furthermore, their perceptions of technology are indicators of cognitive change. They started to perceive technology as a timesaving tool that helps them both personally and professionally. Teachers evidently developed an awareness of technology as they socially

¹ Some teachers in Cameron County Head Start had basic technology skills prior to the 'grant' but they had similar experiences like other teachers who were just beginning to learn about technology through the project activities.

participated in the learning process. They think that “*with the way the world is today*” technology is necessary, and they do not want to be “*left out,*” yet they are also aware that technology is “*changing all the time.*”

Finally, *behavioral change* is evident in teachers’ accounts of how they have been using technology. The following excerpt from a teacher interview summarizes the ways they used technology:

We had to use the computers to type our reports; we get on there to look up information, to do researching on the Internet, we use them to... Gosh for everything! We type our reports on them, we look up research, of course, you can get into that one program, and you know make the little designs, and you know, make it look really pretty, make it professional, and we could do all that with it. (FC, Teacher 3, Interview)

According to the TLT Project Coordinator, teachers as non-traditional learners made more progress because “*they had farther to go*” compared to their more advantaged peers who already had *those technology skills*” (Heather, Interview 2). While it was “*one more job to do*” and an object of fear, the early childhood teachers started to use computers to do various tasks. These included conducting research, writing papers, registering for college courses online, finding resources for their classroom and communicating with professors on campus. These activities cited by the teachers are indicators of the behavioral change in using technology.

DISCUSSION AND CONCLUSION

This study describes the outcomes of an exemplary professional development approach in supporting early childhood teachers’ technology in Head Start, namely the communities of learner model advocated by the TLT Project. It highlights the social nature of learning and supports existing literature that emphasizes social constructivist principles in technology learning. Indeed, the use of technology in education is a complex endeavor, requiring recognition of technology as a cultural construct and of the social processes involved in learning technology. The findings of this study regarding the nature of teachers’ involvement and participation in technology via the communities of learner model are in parallel with prior studies. The consensus among researchers is that if learning is experience-based, contextualized, collaborative, and empowering it can effect change in practice (Darling-Hammond & McLaughlin, 1995; Lieberman, 1995; Little, 1993). The social constructivist theory defines learning as embedded in social and cultural activities and emphasizes the crucial role played by peers and other community members in scaffolding the learning (Cole, 1978; Kozulin, 2002; Rogoff, 1995; Vygotsky, 1978). Technology learning is a social activity; therefore, authentic and collaborative learning experiences supporting adult learners should be emphasized for technology learning as opposed to simply offering direct individual decontextualized instruction in technology training (Holt & Crocker, 2000; King, 2002; McCotter, 2001; Wood et al. 2002). The teachers’ existing needs to pursue a degree in Head Start had created a meaningful context for them. Having colleagues who were following the same path and experiencing the similar struggles created “*a plane of collaboration*” and “*a source of support*” in this study. The emotional, cognitive and behavioral changes among teachers were the evidence of empowerment of teachers by the end of the project. The early childhood teachers in Head Start needed technology “*to get through school.*” The teachers’ learning was embedded in social processes beyond modeling. First, technology learning was meaningful and relevant to the needs of early childhood teachers since they were pursuing a degree. Second, they were positioned in such ecologies of learning that kept them engaged in technology as they interacted with their peers, co-workers, children and technology trainers in their agencies, i.e. with people with whom they felt comfortable.

Previous studies identified the significance of the learning context in affecting the attitudes and learning outcomes for learners (Henning & Van der Westhuizen, 2004; VanderVen, 1994). Learning technology can evolve into innovative uses of educational technology over time if the learning context is supportive of the needs of adult learners. However, the learning context has to include more than mere physical access to technology and computer training (Foster, 2000). Technology learning can be non-threatening for adult learners if they can form communities of learners in a social support framework (Calderwood, 2000; Fyson, 1999; McMillian & Chavis, 1986; Sergiovanni, 1994b, 1999).

Adult learners' affective experiences with technology include reluctance, fear, anxiety, tension, confidence, and comfort (Hillesheim, 1998; Kotrlik & Redmann, 2005; Lawson, 2005; Russell, 1995; Selwyn, 2002). Findings regarding the Head Start teachers' experiences with technology in this research are in parallel with these studies and they further shed light on the intricacies of the technology learning as a cultural adaptation process. In fact, technology as a new cultural tool presents challenges and struggles for Head Start teachers. As this study has shown, when teachers confront these challenges as a community, they can become more empowered and proficient in the use of technology. Therefore, educational organizations should create an ecology of learning that scaffolds technology learning and provide contexts of interactions and communication through ongoing community support and collegiality (Bruckman, 1998; McCotter, 2001; Svensson, 2000; Thomas et al., 1998) for adult learners, who need multiple points of access and social support. Leadership commitment and foresight are also vital to create and sustain communities of learners engaged in technology (Anderson & Dexter, 2005; Sergiovanni, 1994a, 1994b). Presenting technology in a social framework that promotes communities of learners can sustain the integration of information technologies. Through such ecologies of learning, adult learners can remain engaged learners and users of technology.

In this study, Head Start teachers faced their fears of technology and developed technology awareness through a professional development model that promoted the communities of learners and supported adult learners because they had access to both physical and social spaces of support and technological resources. Such ecologies that support adult learners' multiple needs were created through the leadership and advocacy of administrators in the two Head Start Agencies. The administrators had the foresight and cultural insight regarding the needs of early childhood teachers and developed capacity in the agencies to provide both physical and social access to technology.

In conclusion, it is not the technology, but teachers, students, and communities that transform education, and "technology merely provides some of the tools and processes that can support educational reform and create pressure for change" (Fullerton, 1998, p.74). From another perspective, Weston (2005) points that technology access, and organizational factors are major obstacles to technology integration. Early childhood educators, more specifically Head Start teachers are embracing technology, yet they need basic technological resources and supportive learning environments for professional development. Especially those in low-income communities are faced with many obstacles on a daily basis. Policy makers should be cognizant of early childhood educators' needs for access to technology and information and for supportive leadership structures that stimulate teachers' motivation to learn and use technology should be emphasized. Simply having computers and Internet connection in schools will not automatically lead to innovative uses of technology, but professional support in the form of communities of learners will, as documented in this study and others. To achieve the goal of integrating technology in education, access to technology should be redefined to be inclusive of the nature of learners, learning contexts, and the nature of learning.

This study was limited to documenting the experiences of teachers in two Head Start agencies; therefore, further research studies using different methods and theoretical frameworks are recommended to document the experiences of teachers' technology learning in different early childhood settings across different states and cultural settings. This study also focused on the professional development experiences of Head Start teachers as nontraditional learners. The future research may inquire into the technology proficiency of typical early childhood teachers who follows a traditional route to being a teacher. These recommendations also apply to researchers and the educators in the early childhood field in Turkey as the policy makers are now emphasizing technology use at all grade levels. Based on results here, the communities of learner model should replace the common seminar form of professional development in technology, which is framed outside the daily contexts of teachers' work. Such new models in professional development can involve peer learning, collaboration, and on-site and on-time support in schools. In this regard, the school principals play a key role and they should create supportive environments for early childhood teachers to use and learn technology in authentic contexts.

REFERENCES

- Akçaoglu, M., Gümüş, S., Bellibaş, M. S., & Boyerd, D. M. (2015). Policy, practice, and reality: Exploring a nationwide technology implementation in Turkish schools, *Technology, Pedagogy and Education*, 24 (4), 477-491, <http://dx.doi.org/10.1080/1475939X.2014.899264>
- Anderson, R. E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect, *Educational Administration Quarterly*, 41(1), 49-82.
- Archer, K., Savage, R., Sanghera-Sidhu, S., Wood, E., Gottardo, A., & Chen, V. (2014). Examining the effectiveness of technology use in classrooms: A tertiary meta-analysis, *Computers & Education*, 78, 140-149.
- Ball, R. A. (2002). Strategies for building partnerships with academic institutions, *Head Start Bulletin*, 72, 3-4.
- Barron, L. C., & Goldman, E. S. (1994). Integrating technology with teacher preparation. In B. Means (Ed.), *Technology and education reform: The reality behind the promise* (pp. 81-110). San Francisco: Jossey-Bass Publishers.
- Becker, H. J. (1991). How computers are used in United States schools: Basic data from the 1989 I.E.A. computers in education survey, *Journal of Educational Computing Research*, 7(4), 385-406.
- Bell, R. L., Maeng, J. L., & Binns, I. C. (2013). Learning in context: Technology integration in a teacher preparation program informed by situated learning theory, *Journal of Research in Science Teaching*, 50(3), 348-379.
- Berger, P., & Luckmann, T. (1967). *The social construction of reality: A treatise in the sociology of knowledge*. Garden City, NY: Anchor.
- Bruckman, A. (1998). Community support for constructionist learning, *Computer Supported Cooperative Work (CSCW)*, 7(1/2), 47-86.
- Buyse, V., Winton, P. J., Rous, B., (2009). Reaching consensus on a definition of professional development for the early childhood field, *Topics in Early Childhood Special Education*, 28 (4), 235-243. DOI: 10.1177/0271121408328173
- Calderwood, P. (2000). *Learning communities: Finding common ground in difference*. New York: Teachers College, Columbia University.
- Cobb, P., & Bowers, J. (1999). Cognitive and situated learning perspectives in theory and practice. *Educational Researcher*, 28(2), 4-15.
- Cole, M. (Ed.). (1978). *Mind in society: The development of higher psychological processes / L. S. Vygotsky*. Cambridge: Harvard University Press.
- Cookson, P. W. J. (1995). The federal commitment to educational reform 1973-1993: From self-help to systemic reform. In W. T. Pink & G. W. Noblit (Eds.), *Continuity and contradiction: The futures of the sociology of education* (pp. 239-254). Cresskill, New Jersey: Hampton Press, Inc.
- Corbin, J. (1986). Coding, writing memos, and diagramming. In C. W. Chenitz & J. Swanson, M. (Eds.), *From practice to grounded theory* (pp. 102-120). Menlo Park, CA: Addison-Wesley Publishing Company.
- Damarin, S. K. (2000). The 'Digital Divide' versus digital differences: Principles for equitable use of technology in education, *Educational Technology*, 40(4), 17-22.
- D'Amico, J. J. (2001). Technology in America's schools: An overview of status and issues, *ERS Spectrum*, 19(1), 4-8.
- Darling-Hammond, L., & McLaughlin, M. W. (1995). Policies that support professional development in an era of school reform, *Phi Delta Kappan*, 76(8), 597-604.
- Erickson, F. (1986). Qualitative methods in research on teaching. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (pp. 119-161). New York: McMillian.
- Fine, M., Weis, L., Weseen, S., & Wong, L. (2000). For whom? Qualitative research, representations, and social responsibilities. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 107-133). Thousand Oaks, CA: Sage Publications, Inc.
- Foster, S. P. (2000). The digital divide: Some reflections, *International Informatics & Library Review*, 32, 437-451.
- Fullerton, K. (1998). Common "Mythstakes" in technology planning. In K. C. Westbrook (Ed.), *Technology and the educational workplace: Understanding fiscal impacts* (pp. 63-76). Thousand Oaks, CA: Corwin Press.
- Fyson, S. J. (1999). Developing and applying concepts about community: reflections from the field, *Journal of Community Psychology*, 27(3), 347-365.
- Garland, V. E., & Wotton, S. E. (2001). Bridging the digital divide in public schools, *Journal of Educational Technology Systems*, 30(2), 115-123.
- Gergen, K. J. (2001). *Social construction in context*. London and New Delhi: Sage Publications.
- Gladieux, L. E., & Swail, W. S. (1999). *The Virtual University & educational opportunity. Issues of Equity and Access for the Next Generation. Policy Perspectives*. (ERIC Document Reproduction Service. No. ED. 428637).
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine Publishing Co.

- Glaser, B. G., & Strauss, A. L. (2001). The discovery of grounded theory and applying grounded theory. In N. K. Denzin & Y. S. Lincoln (Eds.), *The American tradition in qualitative research* (Vol. II, pp. 229-243). London, Thousand Oaks, New Delhi: Sage Publications.
- Grundy, S. (1999). Patterns in learning: School-based and university-based communities of learning. In J. Retallick, K. Coombe & B. Cocklin (Eds.), *Learning communities in education* (pp. 44-59). New York: Routledge.
- Hamby, T. M. (1975). *My teacher is a CDA*. Washington, D.C.: University Research Corporation.
- Helleve, I. (2009). Theoretical foundations of teachers' professional development. In J. O. Lindberg & A. D. Olofsson (Ed.). *Online learning communities and teacher professional development: Methods for improved education delivery*. (pp. 1-19) Hershey, PA, New York: IGI Global.
- Henning, E., & Van der Westhuizen, D. (2004). Crossing the digital divide safely and trustingly: how ecologies of learning scaffold the journey, *Computers and Education*, 42(4), 333-352.
- Herrenkohl, L. R., & Wertch, J. V. (1999). The use of cultural tools: Mastery and appropriation. In I. E. Siegel (Ed.), *Development of mental representation. Theories and applications* (pp. 415-435). Mahwah, New Jersey, London: Lawrence Erlbaum Associates, Publishers.
- Hillesheim, G. (1998). Distance learning: Barriers and strategies for students and faculty, *The Internet and Higher Education*, 1(1), 31-44.
- Holt, D. T., & Crocker, M. (2000). Prior negative experiences: their impact on computer training outcomes, *Computers and Education*, 35(4), 295-308.
- Hong, S. B., & Trepanier-Street, M. (2004). Technology: A Tool for knowledge construction in a Reggio Emilia inspired teacher education program, *Early Childhood Education Journal*, 32(2), 87-94.
- İsçi, T. G., & Demir, S. B. (2015). The use of tablets distributed within the scope of FATİH Project for education in Turkey (is FATİH Project a fiasco or a technological revolution?). *Universal Journal of Educational Research*, 3(7), 442-450. DOI: 10.13189/ujer.2015.030703
- Jenlink, P. M., & Kinnucan-Welsch, K. (2001). Case stories of facilitating professional development, *Teaching and Teacher Education*, 17, 705-724.
- Kennedy, A. (2005) Models of continuing professional development: a framework for analysis, *Journal of In-service Education*, 31(2), 235-50.
- Kent, T. W., & McNergney, R. F. (1999). *Will technology really change education? From blackboard to web*. Thousand Oaks, CA: Corvin Press, Inc.
- King, K. P. (2002). Educational technology professional development as transformative learning opportunities, *Computers and Education*, 39(3), 283-297.
- Kotrlik, J. W., & Redmann, D. H. (2005). Extent of technology integration in instruction by adult basic education teachers, *Adult Education Quarterly*, 55(3), 200-219.
- Kozulin, A. (2002). Sociocultural theory and the mediated learning experience, *School Psychology International*, 23(1), 7-35.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, England: Cambridge University Press.
- Lawson, K. G. (2005). Using eclectic digital resources to enhance instructional methods for adult learners, *OCLC Systems & Services: International Digital Library Perspectives*, 21(1), 49-60.
- Levinson, B. A. U., & Sutton, M. (2001). Policy as practice- A Sociocultural approach to the study of educational policy. In B. A. U. Levinson & M. Sutton (Eds.), *Policy as practice: Toward a comparative sociocultural analysis of educational policy* (pp. 1-22). Westport, Connecticut and London: Ablex Publishing.
- Lieberman, A. (1995). Practices that support teacher development, *Phi Delta Kappan*, 76(8), 591-596.
- Light, J. S. (2001). Rethinking the digital divide, *Harvard Educational Review*, 71(4), 709-733.
- Little, J. W. (1993). Teacher professional development in a climate of educational reform, *Educational Evaluation and Policy Analysis*, 15(2), 129-151.
- Long, D., & Riegle, R. (2002). *Teacher education: The key to effective school reform*. Westport, Connecticut: Bergin & Garvey.
- Lubeck, S., deVries, M., Nicholson, J., & Post, J. (1997). Head Start in transition, *Early Education & Development*, 8(3), 219-244.
- Mantilla, E. M. (2001). Teachers' perceptions of their participation in policy choices: The bottom-up approach of the Nueva Escuela Unitaria in Guatemala. In M. Sutton & B. A. U. Levinson (Eds.), *Policy as practice: Toward a comparative sociocultural analysis of educational policy* (pp. 103-123). Connecticut: Ablex Publishing.
- Marcus, G. E. (1998). *Ethnography through tick and thin*. Princeton, New Jersey: Princeton University Press.
- Martinez-Beck, I., & Zaslow, M. (2006). Introduction: The context for critical issues in early childhood professional development. In M. Zaslow & I. Martinez-Beck, (Eds). *Critical issues in early childhood professional development* (p. 1-16). Baltimore: Brooks.

- McCotter, S. S. (2001). Collaborative groups as professional development, *Teaching and Teacher Education*, 17, 685-704.
- McDonald, S. D. (2001). Capital info: E-rate for everyone, *Momentum*, 32(2), 77-78.
- McMillian, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of Community Psychology*, 14, 6-22.
- Mergendoller, J. R. (2000). Technology and learning: A critical assessment, *Principal*, 79(3), 5-9.
- Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco: Jossey-Bass Publishers.
- National Association for the Education of Young Children & the Fred Rogers Center (2012). Technology and interactive media as tools in early childhood programs serving children from birth through age 8. A position statement. Retrieved on 10-March-2017 at http://www.naeyc.org/files/naeyc/file/positions/PS_technology_WEB2.pdf.
- National Association for the Education of Young Children (NAEYC) (1993). A conceptual framework for early childhood professional development. Retrieved on 10-March-2017 at <https://www.naeyc.org/files/naeyc/file/positions/PSCONF98.PDF>
- Ortega, M., & Bravo, J. (2001). *Computers and education: Towards an interconnected society*. Dordrecht; Boston: Kluwer Academic Publishers.
- Parker, E. B. (2000). Closing the digital divide in rural America, *Telecommunications Policy*, 24, 281-290.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage.
- Payne, J. S. (1973). *Head Start: A tragicomedy with epilogue*. New York: Behavioral Publications.
- Post, J., & Lubeck, S. (2000). Head Start-university collaborations: Widening the circle, *Annual Theme*, 277-282.
- PT³ Website. (2002). *Transforming teacher education through technology infusion*. Retrieved on 17-November-2002 at <http://www.pt3.org/>
- Retallick, J. (1999). Transforming schools into learning communities: Beginning the journey. In J. Retallick, B. Cocklin & K. Coombe (Eds.), *Learning communities in education* (pp. 107-131). New York: Routledge.
- Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation, guided participation, and apprenticeship. In J. V. Wertsch, P. Del Rio & A. Alvarez (Eds.), *Sociocultural studies of mind* (pp. 139-164). New York: Cambridge University Press.
- Russell, A. L. (1995). Stages in learning new technology: naive adult email users, *Computers & Education*, 25(4), 173-178.
- Schwab, R. G. (2001). "That school gotta recognize our policy!" The appropriation of educational policy in an Australian Aboriginal Community. In M. Sutton & B. A. U. Levinson (Eds.), *Policy as practice* (pp. 219-243). Connecticut: Ablex Publishing.
- Selwyn, N. (1997). The continuing weakness of educational computing research, *British Journal of Educational Technology*, 28(4), 305-307.
- Selwyn, N. (2002). 'E-stablishing' an inclusive society? Technology, social exclusion and UK government policymaking, *Policy Studies Journal*, 29(4), 551-570.
- Sergiovanni, T. (1994a). *Building community in schools* (1st ed.). San Francisco: Jossey-Bass.
- Sergiovanni, T. (1994b). Organizations or communities? Changing the metaphor changes the theory, *Educational Administration Quarterly*, 30, 214-226.
- Sergiovanni, T. (1999). The story of community. In J. Retallick, B. Cocklin & K. Coombe (Eds.), *Learning communities in education* (pp. 9-25). New York: Routledge.
- Shapiro, N. S., & Levine, J. H. (1999). *Creating learning communities: a practical guide to winning support, organizing for change, and implementing programs* (1st ed.). San Francisco: Jossey-Bass Publishers.
- Sheridan, S. M., Edwards, C. P., Marvin, C. A. & Knoche, L. L. (2009). Professional development in early childhood programs: Process issues and research needs, *Early Educ Dev.*, 20(3), 377-401. DOI:10.1080/10409280802582795
- Shin, W. (2015). Teachers' use of technology and its influencing factors in Korean elementary schools. *Technology, Pedagogy and Education*, 24 (4), 461-476. <http://dx.doi.org/10.1080/1475939X.2014.915229>
- Spradley, P. J. (1979). *The ethnographic interview*. New York, London, Sydney: Holt, Rinehart and Winston.
- Svensson, A. K. (2000). Computers in school: Socially isolating or a tool to promote collaboration? *Journal of Educational Computing Research*, 22(4), 437-453.
- Thomas, G., Wineburg, S., Grossman, P., Myhre, O., & Woolworth, S. (1998). In the company of colleagues: An interim report on the development of a community of teacher learners, *Teaching and Teacher Education*, 14(1), 21-32.
- Thurston, C. O., Secaras, E., D., & Levin, J. A. (1996). Teaching tele-apprenticeships: An innovative model for technology integration in teacher education, *JRCE*, 28(5), 1-7.

- Turbill, J. (2001). A Researcher goes to school: Using technology in the kindergarten literacy curriculum, *Journal of Early Childhood Literacy*, 1(3), 255-279.
- VanderVen, K. (1994). Professional development: A contextual model. In J. Julienne & J. B. McCracken (Eds.), *The early childhood career lattice: Perspectives on professional development* (pp. 79-89). Washington, D.C.: NAEYC.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Ward, M. & Costello, E. (2016). Education reform with technology - difficult but worth the effort? In *Proceedings of Global Learn 2016 Association for the Advancement of Computing in Education (AACE)* (pp. 71-78). Retrieved on 12-July-2016 at <https://www.learntechlib.org/p/172711>.
- Warschauer, M. (2002). Reconceptualizing the digital divide, *First Monday*, 7(7), 1-16.
- Washington, V., & Bailey, O. U. J. (1995). *Project Head Start: models and strategies for the twenty-first century*. New York: Garland Pub.
- Wedman, J., & Diggs, L. (2001). Identifying barriers to technology-enhanced learning environments in teacher education, *Computers in Human Behavior*, 17, 421-430.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge, U.K.; New York, N.Y.: Cambridge University Press.
- Wenger, E., McDermott, R. A., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston: Harvard Business Press.
- Wertsch, J. K., Tulviste, P., & Hagstrom, F. (1993). A Sociocultural approach to agency. In E. A. Forman, N. Minick & C. A. Stone (Eds.), *Contexts for learning: Sociocultural dynamics in children's development* (pp. 336-356). Oxford, New York: Oxford University Press.
- Weston, T. J. (2005). Why faculty did-and did not-integrate instructional software in their undergraduate classrooms, *Journal of Innovative Higher Education*. 30(2), 99 - 115.
- Wood, E., Willoughby, T., Specht, J., Stern-Cavalcante, W., & Child, C. (2002). Developing a computer workshop to facilitate computer skills and minimize anxiety for early childhood educators, *Journal of Educational Psychology*, 94(1), 164-170.
- Yelland, N. (1999). Technology as play, *Early Childhood Education Journal*, 26(4), 217-220.
- Zaharlick, A. (1992). Ethnography in anthropology and its value for education, *Theory into Practice*, 31(2), 58-67.
- Zigler, E., & Muenchow, S. (1992). *Head Start: The inside story of America's most successful educational experiment*. New York: BasicBooks.
- Zyad, H. (2016). Integrating computers in the classroom: Barriers and teachers' attitudes, *International Journal of Instruction*, 9(1), 65-78.