RECOGNIZING AND ENHANCING TEACHERS' USE OF TECHNOLOGY FOR HIGHER PURPOSES OF LEARNING TO INCREASE CLASSROOM DIGITAL LITERACY INTEGRATION

A Dissertation

by

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ABSTRACT

In this study, I hypothesize that various factors impact teachers' digital learning identity (DLI). Such factors include; (1) instruction, (2) experience, and/or (3) application. As learning identity relates to perception of confidence and ability, a possible link exists between teachers' DLI (i.e., how they use technology for higher purposes of learning) and the low percentage of teachers using digital literacy (DL) successfully for instruction. To test this hypothesis, I created the *Digital Learning Identity Survey* (DLIS) to determine how teachers' affect toward digital learning changes with direct instruction in DL and what causes these changes. The *DLIS* results serve as a baseline for a coaching model of professional development aimed at assisting teachers in better recognizing their DLI and the influence the coaching model has on such recognition as well as which aspects of coaching were most influential. Using a mixed-methods approach, 11 K-12 teachers in the southwestern United States completed artifacts (e.g., weekly check-ins, goal setting, reflections, and emails) to determine the influence of the coaching model. Additionally, five of the 11 teachers participated in three rounds of semi-structured interviews to determine teachers' motivation to shift their DLI.

Using artifact analysis and *DLIS* results, I drew three major conclusions: (1) these studies demonstrate that by helping teachers recognize their own DLI, we can increase their DL use, moving teachers from solely focusing on their students' DL use to their use; (2) supporting teachers' ability to recognize the ways they can use DL for learning instead of learning to use DL tools may help further develop their DLI, and such recognition is best suited for coaching-based PD; and (3) the literacy research field requires both measures and methods for integrating DL in

classrooms, and the *DLIS* measures aspects of DL, motivation to learn, and self-regulated learning, producing reasonably reliable and valid scores for DLI.

Teachers' interviews indicated various motivations influence a shift in DLI. Overall, linked to Expectancy-Value Theory, teachers showed evidence of motivation linked to individualized coaching based on opportunities to reflect on the influence of their background and experiences on the value they associate with DL and expectancy of success. Reflection enhances realization of background influences, elements of support, and opportunity to learn.

DEDICATION

Through this process my strength has come first from God. Knowing, as proclaimed in Philippians 4:13, that "I can do all things through Christ who strengthens me," with a firm belief that "The Lord gives His people strength. The Lord blesses them with peace" (Psalm 29:11). Without God's strength, guidance, and peace through this process, I would not be here, and I dedicate this dissertation to Him.

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NOMENCLATURE

DL	Digital Literacy
DLI	Digital Learning Identity
DLIS	Digital Learning Identity Survey
PD	Professional Development

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CHAPTER I

INTRODUCTION

Technology transforms the way we envision education today. With technological advancements emerging daily, the education system feels the effect of these advancements more than most other environments (Alaniz & Wilson, 2015). Once seen as a novel way to teach new information, many researchers (Alaniz & Wilson, 2015; Hillman & Marshall, 2009; The United States Department of Education, 2017) now view technology as a large factor contributing to educational success as well as success beyond school. Accompanying this change has been a paradigm shift from a more teaching centered approach to a learning centered approach (Pacansky-Brock, 2017).

Teachers, as the main source of content and pedagogy development, are the leading contributor (or inhibitor) of successful classroom technology integration (Alaniz & Wilson, 2015; Honan, 2008; Kabakçi-Yurdakul, Ursavas, & Becit-Isçitürk, 2014; Kalman & Guerrero, 2013). Teachers must be prepared to guide students in utilizing technology "to investigate, discover and demonstrate understanding" (Alaniz & Wilson, 2015, p. 25). Therefore, investing in teachers' Digital Literacy (DL) skills is ultimately an investment in student success.

Educating students to make meaning through DL encompasses more than the traditional modes of teaching students how to use technology (e.g., using technology for consumption) or implementing technology as a replacement for other instruction (e.g., online tutoring systems). Instead, recognizing students' consumer and producer nature regarding technology in their daily lives (Hutchison & Colwell, 2014), increasing student engagement and ownership of their

learning, can be facilitated through authentic implementation of DL techniques (e.g., using technology for production methods).

Specific to literacy, DL has taken literacy learning to a new level in education. Teachers must develop expertise in incorporating DL skills into their curriculum in a way that provides authentic learning opportunities. Many teachers use DL methods for their own learning purposes, but these methods often do not transfer to classroom instruction. Therefore, to assist teachers in developing DL expertise we need more information about if developing and increasing teachers' recognition of their own DL learning methods will lead to an increase of authentic classroom integration of DL, leading to student achievement.

Students Today

At the time of this writing (2018), the current student generation are predicted to be the most culturally diverse generation to date. This diversity is attributed to them being the first generation raised within a truly digital society, where increased access to knowledge and diverse connections between individuals is enhanced due to advancements in technology. Many students do not know of a time where you could not fast forward through television shows or where a cell phone primarily functioned as a phone — the introduction of smartphones occurred in 2007 (Pacansky-Brock, 2017).

Michael Wesch, an anthropology professor at Kansas State University, created a video in 2007 titled, "Visions of Students Today" that pans through a large college lecture hall and zooms in on comments displayed by students in his class. The students' comments include thoughts such as, "When I graduate, I will have a job that doesn't exist today." Wesch's illustration of student's today paints a picture of a new generation of learners. Learners we must find ways to educate in our changing world. Now, 10 years after Wesch's initial research, the college lecture

hall has not transformed as predicted. In some ways the response to technology has been swift while other institutions are slower to make change and the same is true for K-12 instruction.

Problem Statement

One reason the shift in DL integration may be slow is because many teachers do not associate the DL skills they use daily with classroom DL integration (Honan, 2008). For example, teachers use Pinterest to find new ideas for classroom instruction but do not associate the learning that occurs while they use Pinterest resources (such as watching a video that models read-aloud methods) to craft a lesson. This disconnect between teacher and student DL use often leads to lacking DL integrated in classroom instruction (Hutchison & Woodward, 2014).

Teachers often feel inadequately equipped to effectively integrate DL into their curriculum (Lei, 2009), lacking confidence and competence regarding integration and implementation. While teachers often demonstrate confidence in the DL they use outside their classroom (i.e., Facebook, Pinterest, Twitter), when it comes to using DL skills to learn, both in and out of school, they learn as they go, if at all.

Based on both their personal and professional experiences, teachers regard technology integration differently, often transferring these experiences to DL education (Jolls, 2015). Therefore, to improve the quantity and quality of DL instruction in the classroom, we must first work to recognize how teachers personally use DL, making them more cognizant of their learning processes as well as areas of strength and weakness related to DL, and equip them with the knowledge of and practice related to personal DL learning experiences. Such strengths and weaknesses make up one piece of what constitutes a teachers' digital learning identity (DLI) — the identity developed from perceived competence in personally using DL, where recognition of

DL use may assist educators in seeing themselves as digital learners. This knowledge can inform preparation for teachers and ultimately transfer to the classroom environment.

Overarching Hypothesis

Teachers rarely recognize the many ways in which they use DL, so they do not feel prepared to integrate DL into their classrooms in more meaningful ways. Lacking preparedness may stem from limitations surrounding barriers related to perceived value associated with DL and experiences. Accordingly, if teachers recognize how they personally use DL to learn, DL learning becomes part of their identity, and this identity will transfer to classroom instruction through an increase in DL integration. Namely, recognizing personal DL use would break down barriers as change in perception leads to change in behavior only if DL value changes. Thus, increasing teachers' DLI will increase the quality and quantity of DL integration into classroom instruction.

Conceptual Framework

Theoretical Foundation

Guided by learning theories specific to each study, I overall ground this dissertation in Andragogy (i.e., Adult Learning Theory) (Knowles, 1978). Promoting lifelong learning in teachers must be approached from an adult learning perspective as teachers, in all stages, are adults and the structure of their professional learning opportunities should reflect that of adult learners. Methods of adult learning vary from how K-12 students learn (Perfetti & Marron, 1995). Andragogy highlights six principals aimed at recognizing key characteristics encompassing adult learning. These principals characterize adults as (Alaniz & Wilson, 2015): 1) internally motivated and self-directed, 2) bringing life experiences and knowledge to learning

experiences, 3) goal oriented, 4) relevance oriented, 5) practical, and 6) like to be respected. These principals provided the foundation for study development and implementation.

Operational Definitions and Model

Before detailing this dissertation, I will define several key constructs to ensure consistency of understanding. Technology education often contains overlapping definitions, or multiple words describing similar processes. Therefore, before synthesizing the literature, I identify key constructs of interest and provide working definitions.

Teacher Education. For the context of this research, teacher education refers to any method aimed at educating various levels of teachers. This definition includes in-service teachers receiving instruction to enhance their learning, in-service teachers participating in coaching based professional learning, pre-service teachers enrolled in higher education courses, and pre-service teachers in internship type environments.

Digital Literacy. The National Council of Teachers of English (NCTE) define DL, "as multiple, dynamic, and malleable…inextricably linked with particular histories, life possibilities, and social trajectories of individuals and groups" (n.d.). Further explaining,

> Active, successful participants in this 21st century global society must be able to: develop proficiency and fluency with the tools of technology, build intentional cross-cultural connections and relationships with others so to pose and solve problems collaboratively and strengthen independent thought, design and share information for global communities to meet a variety of purposes, manage, analyze, and synthesize multiple streams of simultaneous information, create, critique, analyze, and evaluate multimedia texts, and attend to the ethical responsibilities required by these complex environments. (NCTE, 2013, n.d.)

While often referred to as DL, synonyms include; new literacy (Nichols, 2012), emerging technology (Pacansky-Brock, 2017), information literacy, computer literacy, technology literacy (Zhong, 2011), media literacy (Spires, Morris, & Zhang, 2012), literacy based technology (Hillman & Marshall, 2009), and 21st century skills (Kivunja, 2014).

Influenced by current research, for the purpose of this study, I define DL as the ability to use digital tools to read, write actively, and communicate (speaking, listening, and viewing) appropriately using digital tools and resources. Furthermore, DL identifies, accesses, manages, integrates, evaluates, analyzes, and synthesizes multiple streams of simultaneous information in a manner that authentically constructs new knowledge, critiques current information, and allows for building connections with others for problem solving through collaboration to strengthen meaning and independent thought.

Learning Identity

Learning identity establishes the identity developed from perceived competence, in this study it refers to personally using DL. Multiple identities define who a person perceives themselves to be, with varying aspects of both role (e.g., mother, wife, teacher) and person (e.g., educated, introverted, competent) identities affecting a person's behavior as one identity cannot guide or control all aspects of a person's life, a balance must be maintained (Stets, 1995). From an educator's perspective, teacher and student well-defined roles create conflict between teacher/learner/facilitator roles — primarily regarding group membership than on performance within the role — making it difficult for teachers to separate their perceived role from their identified group as expectations often cause constraints (Stets & Burke, 2000). Linked to self-regulated learning, the greater commitment one relates to an identity, the greater salience of the

identity and stronger effort put into maintaining the identity (Stryker, 1980; Stryker & Serpe, 1982).

Self-Regulated Learning

Self-regulated learning involves knowing how to monitor your learning (Bjork, Dunlosky, & Kornell, 2013), keeping track of areas of strength and weakness, and working to further develop weak areas for personal achievement and growth **(**Greene, Seung, & Copeland, 2014**).** Regulating personal learning often comes in the form of goal setting, process monitoring, and reflection. In studying self-regulated learning, an interdependence exists between learning and motivation processes not fully understandable apart from each other (Zimmerman, 1990). Furthermore, Greene and colleagues (2014) included self-regulated learning in their definition of critical components of DL learning.

Digital Literacy Motivation

Wigfield and Guthrie's (1995) research on reading motivation's multifaceted nature took the broad construct of motivation, linking it to motivation for students' reading achievement. To date, Wigfield and Guthrie's (1995) work applies to K-12 instruction, but as teachers are learners alongside their students, motivation research, modified for adult learners, remains relevant to the scope of this study.

DL, a reading focused concept, can be conceptualized as mirroring the motivational factors studied by Wigfield and Guthrie (1995). This construct includes both intrinsic and extrinsic motivation. Their study led to a determination of ten dimensions for motivation; efficacy, challenge, curiosity, aesthetic enjoyment, importance, recognition, social, competition, compliance, and work avoidance (Table 1.1) (Wigfield & Guthrie, 1995). Each dimension influences DL motivation.

Table 1.1

Dimensions of Reading Motivation

Efficacy	Beliefs related to task success
Challenge	Difficulty associated with a task
Curiosity	Interest in enhancing learning of the task
Aesthetic Enjoyment	Pleasure associated with the task
Importance	Value associated with the task
Recognition	Receiving credit for completing the task
Social	Completing a task to fit in to a group
Competition	Wanting to outperform on the task
Compliance	Completing a task due to external expectations
Work Avoidance	Completing a task not to have to complete a different task

Within the following literature review, to determine the relationships between DL, motivation, and learning identity, I first review motivational factors related to DL use. Next, I synthesize each motivational factor, which informed my rationale for analyzing the interconnectedness of DL and motivation aspect of my research. Finally, I detail standards for technology integration, barriers for DL implementation, teacher attributes linked to technology use and integration, and research assessing teacher DLI, which informed the rationale for creating a measure for digital identity understanding.

Motivational Factors Related to Digital Literacy Use

Three factors primarily influence a person's motivation to engage in any activity. Namely, beliefs related to ability and efficacy, incentives, and achievement goals (Wigfield & Guthrie, 1995), detailed in Table 1.2. The following sections outline and define each factor in the context of this dissertation. This research focuses on the first two factors, beliefs and incentives, as I did not measure achievement goals as a construct for the purposes of this dissertation.

Table 1.2

Factors Influencing Motivation to Engage

Beliefs related to ability and efficacy	• Reading efficacy • Challenge
Incentives	• Curiosity • Aesthetic enjoyment • Importance • Recognition • Grades (Success)
Achievement Goals	• Social • Competition • Compliance • Work avoidance

Beliefs About Digital Learning Ability and Efficacy

Learning identity, defined as the identity a person develops around a specific discipline (i.e., doctor, carpenter, teacher), sustaining a substantial impact on a person's mindset surrounding their perceived ability to learn and understand a specific concept (Brumberger, 2011; Gee, 2017). This impact includes experiences, achievements, challenges, and feelings of belonging and being capable (Casey & Bruce, 2011). Upon determination of a learning identity, difficulty exists in changing the mindset regarding ability to complete a task successfully. For example, when someone decides they have a weakness in math, they approach tasks involving math with caution and may use their perceived weakness as justification for not partaking in math related activities.

Linked to learning identity (Littlejohn, Beetham, & McGill, 2012), digital identity often indicates technology use surrounding a specific concept (e.g., someone who identifies as a poor math learner will often assume they cannot use mathematics based technology) or focused solely on technology use itself (e.g., someone who decides they're technologically illiterate in all

aspects of technology use). Often resulting from prior technology knowledge and aptitude (Bulger et al., 2014), this mindset appears when individuals state, “I am not good with technology” or “I have a hard time understanding how to use technology”. Digital capital — access to technology and technology education — plays a large part in digital identity development (Gruszczynska, Merchant, & Pountney, 2013) as more experience leads to greater feelings of increased competency.

Addressing the Problem

This dissertation describes three connected studies to address the problem that classroom DL integration currently does not mirror 21st educational needs. Specifically, these studies will address three critical issues in DL research: a) how to measure teachers’ personal DL use — learning occurring at the upper level of Bloom’s taxonomy (inferencing, creating, evaluating) (Ng, 2012), b) the impact of targeted professional development (PD) on teachers’ personal DL use, and c) exploring what motivates teachers to change DL integration in their classroom.

My first study (Chapter II) describes the *Digital Learning Identity Survey* (*DLIS*) development. Currently, most research concerning DL cognition and technology integration presents information from primarily a student perspective (Hall, Atkins, & Fraser, 2014); research focusing on teachers highlights their approaches to teaching DL with little emphasis on how they use DL to learn personally (see Figure 1). This study addresses the problem by creating a tool to measure teachers’ DLI to assist teachers in recognizing how they use DL to learn.

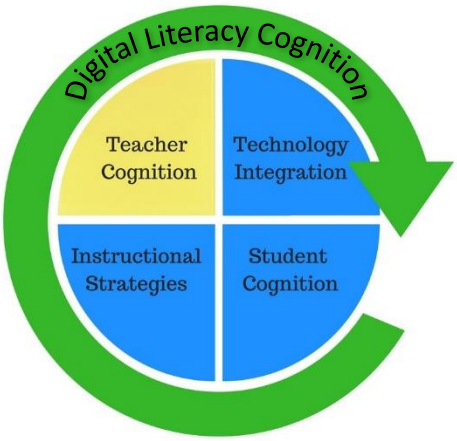

Figure 1. Aspects of Digital Literacy Cognition
Current research indicated in blue and needed research indicated in yellow.

Therefore, Study I's (Chapter II) goal is to create and quantitatively validate a theoretically grounded instrument to measure teachers' digital learning identity — how they use technology for higher purposes of learning — and to examine the extent teachers personally use DL. This instrument development study will describe administration of the created instrument to 206 pre-service teachers and 15 in-service teachers and employ factor analyses to establish the validity of the scores and reliability analyses.

Study II (Chapter III) aims to ascertain how individualized PD, focused on teachers' personal DL use, affects their DLI and if changes in teachers' DLI transfers to changes in classroom DL integration. Many studies examine strategies for implementing DL for classroom instruction (Bulger, Mayer, & Metzger, 2014; Greene et al., 2014; Hargittai, 2009; Maderick, Zhang, Hartley, & Marchand, 2016; Ng, 2012; Pow & Jun, 2012) while fewer investigate teachers' ability to instruct with these tools and their comfort level using them (Gruszczynska et al., 2013**;** Hall et al., 2014).

Specifically, this mixed-methods study's goal is to develop and assess PD through online coaching useful in determining how a teacher's DLI transfers to classroom DL integration and if increasing a teacher's DLI impacts classroom integration. Therefore, the findings from this study address the problem by determining the impact coaching-based PD helps teachers recognize and increase their DL learning, to determine if recognition of DL learning by teachers lead to increase classroom DL integration.

This eight-month long intervention study discusses the developed coaching model along with resources, pre-post analysis of digital identity change, and qualitative analysis. Such a model will be potentially useful for **c**lassroom teachers, administrators, and teacher education programs to better recognize teachers' personal DL use, leading to a more thorough understanding of how to support teachers in integrating DL into the classroom environment. Furthermore, evaluation of a PD model designed to enhance teachers' DLI could help explain the role learning identity plays in teachers' confidence in using DL.

Finally, informed by the analysis conducted in Studies I and II, in Study III (Chapter IV), through case study research and the use of portraitures, I qualitatively explore teacher participants' belief systems, barriers, and motivations to change DL integration in their classroom and the factors leading to change in DL integration and teachers' DLI. To date, research indicates teachers report not integrating DL in their classroom due to lack of adequate PD (Kalman & Guerrero, 2013), and digital ability perceptions have shown to affect technology usage (Timothy, 2009), yet limited work analyzes teachers' ability to recognize their private cognition and agency regarding DL. This study addresses the problem by gaining first-hand knowledge from teachers regarding their DL motivation and confidence as well as further

determining the effectiveness of both the *DLIS* and the DL coaching to determine possible next steps for DL based PD.

Study Setting Description

Due to overlap existing between all three studies, I will present the study setting description here for reference throughout my dissertation.

I recruited participants for portions of all three studies from Learning Academy (pseudonym), a local accredited independent school in the southern United States. Learning Academy serves 350 students in early education programs through twelfth grade. Of the 350 students, 73% are white, 3% are African American, 14% are Asian, 10% identify as other or multiple race, and 7% are in their international student program. Learning Academy requires all students from 5^{th}-12^{th} grade to bring laptops to school daily and encourages teachers to incorporate DL into their classrooms. Students from kindergarten through 4^{th} grade have access to limited class sets of laptops and a few tablet devices. Middle and Upper school teachers (grade 6-12) receive minimal PD on DL integration throughout the school year, led by the Head of Middle School. Preschool (3-5 years old) and Lower School teachers (grade K-5) receive no regular PD on DL integration.

Study Methodology

Study I follow a purely quantitative approach, to psychometrically assess the reliability and validity of a measure designed to help teachers recognize their DLI. Study II analysis follows a mixed-methods approach. Mixed methods research is a "type of research in which a researcher or team of researchers combines elements of qualitative and quantitative reaches approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and

corroboration" (Johnson, Onwuegbuzie, & Turner, 2007, p. 123). Mixed methods design contain three advantages over single method designs as they can answer research questions not answerable through any other methodology, provide stronger inferences, and create opportunity for presenting a more diverse view (Tashakkori & Teddlie, 2003). Coding for qualitative data collected for Study II and III follows the constant comparative method — Grounded Theory (Glaser & Strauss, 1967; Lincoln & Guba, 1985). I include dissertation methodology specifics in Table 1.3.

Table 1.3

Dissertation Methodology, Analysis, Conceptual Framework and Research Questions Organized by Study

Study	Methodology	Analysis	Conceptual Framework	Research Questions
Development and Validation of the Digital Learning Identity Survey	Quantitative	▪ EFA ▪ CFA ▪ Cronbach's α ▪ Correlation analysis	▪ Expectancy Value Theory (Wigfield & Eccles, 2000) ▪ Theory of Experience (Dewey, 1938) ▪ Learning Identity (Gee, 2017)	1. What aspects of teacher digital learning identity are measured by the *Digital Learning Identity Survey?* 2. How reliable are the scores produced by the *Digital Learning Identity Survey* as measured by correlation? 3. How valid are the constructs measured by the *Digital Learning Identity Survey*?
Organization Change Through Individual Change: Teachers' Digital Learning Growth as a	Mixed Methods	• Wilcoxon Signed Rank Test Qualitative coding guided by Glaser and Strauss's (1967) Grounded Theory, data will be coded	• Andragogy (Knowles, 1978) Expectancy Value Theory (Wigfield & Eccles, 2000)	1. In what ways and to what extent does professional development, focused on teachers' personal use of digital literacy, affect teachers' digital

Table 1.3 Continued

Study	Methodology	Analysis	Conceptual Framework	Research Questions
Result of Professional Development		• First cycle coding (round 1) – open coding • First cycle coding (round 2) - a priori coding • Second cycle coding – axial coding • Thematic Analysis overlaid with artifact timeline • Digital Learning Integration Matrix	• Theory of Experience (Dewey, 1938) • Collegial Coaching Model of Technology Integration (Alaniz & Wilson, 2015) • Project Based Learning (Alaniz & Wilson, 2015)	learning identity as measured by self-report, survey data, and artifact analysis? 2. What aspects of professional development were reported as most influential by teachers as measured by self-report? 3. Do changes in teachers' digital learning identity transfer to changes in how they integrate digital literacy within their classrooms as measured by self-report and artifact analysis?
Teacher Motivation to Change Case Study	Qualitative: Portraiture	• Guided by Glaser and Strauss's (1967) Grounded Theory, interviews, survey reflections, and artifacts will be coded • First cycle coding (round 1) – open coding • First cycle coding (round 2) - a priori coding • Second cycle coding – Axial Coding • Thematic Analysis overlaid with artifact timeline	None (Qualitative research begins with no established theory.)	1. What are the motivations of teachers towards shifting their digital learning identity as measured by artifact analysis and self-report? 2. What are the motivations of teachers to shift cognition and affect regarding elements of digital literacy integration in their classroom as measured by self-report?

CHAPTER II

DEVELOPMENT AND VALIDATION OF THE DIGITAL LEARNING IDENTITY SURVEY

Introduction

A classroom built around 21st century tools to teach literacy is no longer the future of education, but a reality of education today. In our current digital age, educators face new challenges never imagined or anticipated by previous teachers or researchers. Students' lives overflow with technological tools allowing them access to information at unimaginable rates. If teachers are ill prepared to implement these 21st century tools (i.e., digital literacy) into their classrooms, leveraging the available technology that engages and individualizes learning experiences, both teachers and students will suffer (Alaniz & Wilson, 2015). Keeping up with 21st century students, taking the out-of-school literacies they use every day to learn and incorporating those literacies into in-school literacy experiences that are authentic, engaging, and most importantly, increase learning opportunities (Bjorgen & Erstad, 2015) remains imperative for both student and teacher success.

Expertise development extends past technology understanding itself into teaching students how to use digital tools to develop literacy competency and confidence. This expertise includes incorporating technology as a tool for learning instead of methods for learning a tool (Alaniz & Wilson, 2015). Digital literacy (DL) requires students to "think in different dimensions, to take different perspectives, to analyze images, to visually design spaces, and to assemble meaning across multiple modes" (Schneider, 2015, p. 128). DL, as defined by Martin (2008):

> …is the awareness, attitude and ability of individuals to appropriately use digital tools

> and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action, and to reflect upon this process. (p. 166-167)

DL skills are not skills easily developed or mastered by students or teachers. Additionally, teachers' categorization as "digital natives" (Prensky, 2001), does not necessarily indicate knowledge surrounding how to analyze DL tools for educational value or their ability to achieve curricular goals (Schneider, 2015).

Current research in DL often focuses on teachers' attitudes toward classroom DL integration and methods for integration, but frequently approaches the issue from a deficit model (e.g., teachers do not use DL effectively for classroom instruction) (Flewitt, Messer, & Kucirkova, 2015; Hutchison & Woodward, 2014; Kalman & Guerrero, 2013; Schneider, 2015; Sharp, 2014). In contrast, little research looks at teachers' attitudes towards personal DL use, recognizing how they personally use DL to learn (Hall et al., 2014). Thus, this study goes through the process of creating a measure to help teachers recognize their digital learning identity (DLI) (i.e., how they use technology for higher purposes of learning) to ideally assist teachers in recognizing their skills and belief systems, overcoming barriers.

In a study by Grunwald Associates (2010), of one thousand teachers surveyed, only 34% used technology in their classrooms more than 10% of the time. This low usage is even more surprising when considered in conjunction with survey results indicating teachers who utilize technology to facilitate teaching found great benefit to student achievement. If teachers

recognize the benefit of utilizing technology for student achievement why are teachers not using technology more often in their classrooms? What factors contribute to the disconnect between value and use?

We cannot improve this situation until we understand teachers DL learning better. But before we can study DL learning, we must know how to measure it. Therefore, we need tools to measure teachers' DL learning. This study aims to develop such a tool.

Purpose

This study expands upon the line of research describing factors linked to classroom DL integration through the lens of teacher personal development. Expansion begins by developing and validating a measurement tool, the *Digital Learning Identity Survey* (*DLIS*, see Appendix A). This measure is useful in assisting teachers in recognizing their private cognition and agency regarding DL, as well as identify areas of DL strength and weakness.

Specifically, this dissertation chapter documents a survey development study, including a pre-post data analysis to determine the reliability and validity of the scores further. The *DLIS* is potentially useful for classroom teachers, administrators, and teacher education programs to better recognize personal DL use for higher purposes of learning, thus determining how to integrate DL into the classroom environment better. Furthermore, this tool could help explain the role learning identity plays in teachers' confidence in using technology. Built upon a holistic foundation, the theoretical framework and validation process comprises: (1) research related to current digital culture; (2) research related to learning identity, particularly DLI, and; (3) research related to teacher application of both current digital culture and learning identity, with all three components linked to motivation to learn.

Creating an instrument to fully assess teachers' DLI requires analyzing the survey's reliability and validity. Validation is a critical component of measurement development because this process allows the scores to take on meaning. Benson (1998) suggests a strong validation program comprises three distinct components: (a) substantive: collecting existing theoretical and empirical information to define the proposed constructs; (b) structural: determining how the observed variables relate to one another and the main construct of interest; and (c) external: determining whether the measure relates to other constructs as expected. In the present study, I address all three components to fully determine validation of the Digital Learning Identity Survey (*DLIS*). This measure will be used to monitor how professional development (PD) for teachers enhances their digital development as well as identify variables applicable to classroom transfer of digital identity. At the individual level, use of the *DLIS* may help teachers identify areas they should further develop to increase their confidence in integrating DL into their classroom. Table 2.1 summarizes the research questions, hypothesis, data sources, and analyses for this study.

Rationale for Creating a Measure for Digital Identity Recognition

Literacy, often defined as "the ability to read and write print text" (Connors & Sullivan, 2012, p. 221), became further enhanced with the concepts of listening and speaking. While still the framework for learning, the dramatic increase of technology available inside and outside the classroom environment and the introduction of new ways for students to learn and make meaning using DL, has expanded the traditional literacy definition, the way students learn, and hence how teachers must approach literacy instruction. Therefore, our research focus should follow literacy's evolution, or it will become disconnected from our literary reality.

The Common Core Standards (Common Core State Standards Initiative, 2010), Texas State Standards (TEA, 2017), TPACK framework (Mishra & Koehler, 2006), and the National

Technology Plan (U.S. Department of Education, 2017) guided *DLIS* creation. Starting with the revised version of Bloom's Taxonomy (Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, ... & Wittrock, 2001) as the basis for the survey, I analyzed state and national standards to both provide rationale for the study and to aid in creating a measure designed to assess DLI.

The Common Core Standards—the national academic standards establishing a common national index of academic content —have been adopted by 47 of the 50 states in the U.S., making them the pre-eminent source of information taught in public schools in America. The Common Core Standards' document itself begins with an introduction of what they depict are not actual standards, but a portrait of a student who meets the standards. While a specific section for technology does not exist in the standards themselves, the Common Core standards incorporate technology standards into the content, in all grade levels. For example,Writing Standards, Grade 9-10 students; "Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically" (Common Core State Standards Initiative, 2010, p. 46).

Regarding technology, the document states (Common Core State Standards Initiative, 2010):

> Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals. (p. 7)

This introduction emphasizes the importance of technology integration in our education system, raising the question, can teachers achieve the same level or standard set above as expected of the students they teach? Accordingly, for survey creation, I consulted the Common Core Standards to inform elements necessary for evaluating DL learning, mirroring skills students need as successful learners.

The State of Texas has chosen not to adopt the Common Core Standards and instead implements the Texas Essential Knowledge and Skills (TEKS), a set of standards functioning similarly to the Common Core Standards. The TEKS highlight technology use throughout each content area and grade level (e.g., Language Arts and Reading, Grade K; "recognize characteristics of multimodal and digital texts") with an additional section dedicated to technology skills (e.g., Technology Standard, Grade K-2; "evaluate the appropriateness of a digital tool to achieve the desired product" (TEA, 2017). Consultation of the TEKS during the survey creation process integrated elements relevant to literacy content.

In response to changes necessary for technology integration and standards developing at various levels, the U.S. Department of Education created the National Education Technology Plan (2017) to reflect changes in the United States Education System. The National Technology Plan is a call to action surrounding a vision for technology enabled learning. It includes a collection of recommendations highlighting real world examples, written for practitioners, policymakers, administrators, and teacher educators. The plan's primary goal is to make possible "everywhere, all-the-time learning" (U.S. Department of Education, 2017, p. 4). In the stages of survey development, I consulted the National Education Technology Plan for elements of learning beyond classroom integration, highlighting skills fostering constant learning.

While different from a specific set of standards or examples, Technology Pedagogical Content Knowledge (TPACK) is a form of knowledge necessary for meaningful technology use to emerge (Mishra & Koehler, 2006), making its consideration pivotal to this study. Over the past decade, TPACK has led the charge in reforming how we define a 21st century teacher (Maderick et al., 2016). Emphasizing the importance of analyzing how technology is used instead of looking at the technology itself, Mishra and Koehler (2006) stress the importance of utilizing the TPACK framework to help "understand teachers' development toward rich uses of technology" (p. 1019). This framework looks at the interrelated knowledge developed when combining content, pedagogy, and technological knowledge, moving from looking at all three elements individually to analyzing the contextual relationship contained. During the survey development stage, I consulted the TPACK framework to ensure evaluation focused on using technology to learn, not as a tool.

Conceptual Framework

Based on three theories linked to identity development, this study is primarily guided by Expectance Value Theory (Wigfield & Eccles, 2000), Theory of Experience (Dewey, 1938), and Learning Identity (Gee, 2017). All three theories link to motivation, a factor necessary for effective DL integration. As a pivotal component in much of human interaction, motivation explains all spectrum of human activity (Olson, 2010). While many theoretical models explain motivation, motivation is complex, multifaceted, and depends upon the context and activity (Deci, Vallerand, Pelletier, & Ryan, 1991). Motivation is specifically important to my work because in combination with learning identity, motivation may contribute to differences in DL usage (Hobbs & Tuzel, 2017).

The motivation to personally use DL can also be described as complex, multifaceted, and context dependent (i.e., intrinsic versus extrinsic motivation). In teacher education, researchers often focus on factors related to motivation to learn, but rarely related to technology. When learning opportunities include technology, the focus is primarily on learning to use technology, not using technology to learn (National Reading Panel, 2000). Therefore, I incorporate multiple theories linked to motivation into the foundation for this survey development, arguing these theories can help explain why variability surrounding personal DL use (i.e., gender, self-efficacy, age, identity) remains an often-misunderstood concept.

Expectancy Value Theory

Motivation greatly influences an individuals' choice, persistence, and performance, explained by various beliefs about how well the individual will do on an activity (ability) and the value they associate with said activity (Wigfield & Eccles, 2000). Such beliefs include perceived difficulty, individual goals, and perceptions of previous experiences (Wigfield & Eccles, 2000). Beliefs about ability play a large role in various motivational theories (e.g., Deci & Ryan's (1985) Self-determination theory and Covington's (1992) Self-worth theory). Teachers' often associate expectation of success in DL integration with their DLI and their motivation to personally use DL. If we can shift a teacher's DLI, we might enhance their expectation of success, thereby increasing their motivation.

Theory of Experience

Theory of Experience (Dewey, 1938) details the connection between experience and education. Quality of teachers' experiences regarding DL effects their education much more than quantity. As Dewey (1938) explains, it is insufficient to insist on or require experiences, the effect of the experience and how the experience influences future experiences are most

impactful. From a DL integration perspective, PD cannot be implemented as a means to solely present knowledge or provide multiple resources for implementation. Instead, PD should focus on application, relevance, significance, and include aspects of reflection and follow-up to gauge for effectiveness and impact.

Learning Identity

When a person develops an identity based around a particular discipline, they become "networked to the values, norms, practices, and shared knowledge and skills…continually [transforming] effective ways to do certain things and solve certain problems (Gee, 2017, p. 85). This network influences how a person behaves to maintain consistency with perceived identity (Burke, 1991; Swarm, 1983). Such identities are complex—seen as both a noun (being) and a verb (doing) — containing high levels of diversity within an identity based on a combination of background knowledge and experience influencing understanding (Gee, 2017). For example, learners learn and gardeners garden. DLI exemplifies one form of activity-based identity a person can relate to (Gee, 2017).

Besides activity-based identities, Gee (2017) also discusses relational identities, the identities often not chosen but assigned or imposed on individuals. Relational identities often derive from cultural aspects, such as upbringing and family, and exist in three ways; (1) a classification applied that an individual reject, (2) a classification an individual identifies with, and (3) a classification an individual is conflicted about (Gee, 2017). Prensky's (2001) definition of digital natives could be construed as a relational identity concerning DLI.

How These Theories Inform This Work

In forming the *DLIS*, these theories informed item creation and specific constructs necessary to measure DLI. For example, related to Theory of Experience, survey item creation

included “When I use technology, I combine ideas I already have with ideas I learn to form new understandings”.

Furthermore, according to the U.S. Department of Education regarding teachers’ use of educational technology (e.g., DL) in U.S. public schools (Gray, Thomas, & Lewis, 2010), 97% of classrooms had at least one computer in their classroom (5.3:1 of computers to classrooms), with 93% of those computers having internet access. Even with this high resource availability, teachers reported low percentages of technology being used in their classroom and the technology used is limited, mostly used by teachers, not students. What students use lacks DL components. These components, outlined by Greene and colleagues (2014) definition of critical components of DL, include self-regulated learning and epistemic cognition, and are additional factors influencing the developing concept of a teacher’s DLI for this study.

Methodology

The objective for this instrument development was to create a tool able to produce scores that are both theoretically and psychometrically valid and reliable, useful for teachers’ self-identification and recognition of their own learning identity as it relates to DL. Development required analysis of multiple competing models, both from a literacy and technological perspective. I include research questions and analysis for this study in Table 2.1. The following sections focus on instrument development, highlighting competing models.

Table 2.1

Study I Research Questions and Analyses

Study Presumption	Research Questions	Hypothesis	Data Sources (* previously collected)	Analysis
Components of digital literacy, motivation, and learning identity accurately assess teachers' digital learning identity.	1. What aspects of teacher digital learning identity are measured by the *Digital Learning Identity Survey?* 2.	The Digital Learning Identity Survey measures aspects of self-regulated learning, attitude, mindset, knowledge sources, knowledge achievement, efficacy, curiosity, importance, and challenge as related to digital literacy and motivation.	• *Pilot *DLIS* Survey Version 1 with TAMU Educational Technology classes in September 2017 • *Pilot *DLIS* Survey Version 1 with TAMU Senior Methods classes in September 2017 • *Pilot *DLIS* Survey Version 2 with TAMU Educational Technology classes in November 2017 • *Pilot *DLIS* Survey Version 2 with TAMU Senior Methods classes in November 2017 • *DLIS* Survey Version 3 administered to Learning Academy teachers in January 2018 • *DLIS* Survey Version 3 administered to Learning Academy teachers in August 2018	• EFA • CFA
	3. How reliable are the scores produced by the *Digital Learning Identity Survey* as measured by correlation?	The reliability of the scores of the *Digital Learning Identity Survey* will fall within the same range as previously recorded research with the entire survey and each common factor containing a Cronbach's α of 0.7 or higher.	• *Pilot *DLIS* Survey Version 1 with TAMU Educational Technology classes in September 2017 • *Pilot *DLIS* Survey Version 1 with TAMU Senior Methods classes in September 2017 • *Pilot *DLIS* Survey Version 2 with TAMU Educational Technology classes in November 2017 • *Pilot *DLIS* Survey Version 2 with TAMU	• Cronbach 's α – (full scale and by individual sub-scale)

Table 2.1 Continued

Study Presumption	Research Questions	Hypothesis	Data Sources (* previously collected)	Analysis
			Senior Methods classes in November 2017 • *DLIS* Survey Version 3 administered to Learning Academy teachers in January 2018 • *DLIS* Survey Version 3 administered to Learning Academy teachers in August 2018	
	4. How valid are the constructs measured by the *Digital Learning Identity Survey*?	Constructs of digital literacy, motivation, and learning identity each load to their own unique factor with coefficients greater than 0.4 upon analysis, indicating digital literacy, motivation, and learning identity are accurately measured by the Digital Learning Identity Survey.	• *Pilot *DLIS* Survey Version 1 with TAMU Educational Technology classes in September 2017 • *Pilot *DLIS* Survey Version 1 with TAMU Senior Methods classes in September 2017 • *Pilot *DLIS* Survey Version 2 with TAMU Educational Technology classes in November 2017 • *Pilot *DLIS* Survey Version 2 with TAMU Senior Methods classes in November 2017 • *DLIS* Survey Version 3 administered to Learning Academy teachers in January 2018 • *DLIS* Survey Version 3 administered to Learning Academy teachers in August 2018	• EFA • CFA • Correlation analysis

Instrument Development — Version 1

While other tools measuring DL competency and academic affect — the impact of DL on student growth — exist (see Maderick et al., 2016), these measures focus on teaching others.

There remains a need for a valid and reliable measure of personal development of DL skills to assist teachers in recognizing how they use DL to learn, making this knowledge more transferable to classroom integration for student learning. Many related tools designed to measure select aspects of DL were consulted in the development of the *DLIS* (see Table 2.2), but I focus on only the following two here because these measures most closely align with the study constructs.

Consulted Measures

Upon examination of existing tools for measuring technological and literacy competencies, the *Reading Maturity Survey* (Thomas, 2013) proved most useful in providing an initial structure for *DLIS* creation. While solely reading based, the *Reading Maturity Survey* focuses on self-identity related to using reading to learn, assessing elements of reading, and helping participants better understand their reading development. As the foundation for DL, reading development and understanding oneself as a reader greatly informs various aspects of how we use DL, making them important elements to this study.

Additionally, definitions of "reading" have expanded to encompass information and communication technology. Sample items in the *Reading Maturity Survey* with significant impact on *DLIS* item development include: "I am comfortable with my reading ability", "Reading helps me make decisions about things", and Reading can transform my thinking" (Thomas, 2013). When originally analyzed, the *Reading Maturity Survey* development research reported a split-half reliability score of 0.85 and a Spearman-Brown estimate of 0.92 regarding survey validity, loading cleanly onto five factors demonstrated through an EFA.

For individual item development, I again used the *Reading Maturity Survey* (Thomas, 2013), along with other survey measures (see Table 2.2). Rephrasing items increased relevancy

related to self-use of DL. For example, I modified “I don’t mind reading out loud” (Thomas, 2013) to, “I don’t mind demonstrating technology I use for others”. Consultation of related survey tools (i.e., substantive component (Benson, 1998)) increased both motivation and reading knowledge for development of a new instrument for measuring teachers’ DLI, grounded in theory and supported by research.

Additionally, one consulted survey, Wigfield and Guthrie’s (1995) *Motivation for Reading Questionnaire (MRQ)*, looks specifically at motivation for reading. As DL focuses heavily on reading, this survey stood as a strong indicator of possible motivation type items to include in the *DLIS.* Sample *MRQ* items focused on reading motivation aiding in item development include: “I usually learn difficult things by reading”, and “I read to learn new information about topics that interest me" (Wigfield & Guthrie, 1995).

Table 2.2

Existing Measures Referenced to Create Digital Learning Identity Survey

Measure	Citation	Description
Digital Competence Survey	Maderick, Zhang, Hartley, & Marchand (2016)	Survey designed to measure the validity of subjective self-assessment of digital competence.
Learning Identity Survey	Li & Demaree (2012)	Survey designed to measure change in a person’s learning identity.
Motivation for Reading Questionnaire	Wigfield & Guthrie (1995)	Likert-style survey of student’s motivations for reading.
The Reading Maturity Survey	Thomas (2013)	Scale with a broad look at reading development encompassing not only basic reading skills but reading habits, attitudes, and dispositions.

Table 2.2 Continued

Measure	Citation	Description
The Technology Integration Assessment Instrument	Britten & Cassady (2005)	Survey including seven dimensions of planning with specific attention to levels of technology integration. Repeated use is anticipated to promote individuals' abilities to track their growth in technology integration.
The Unified Theory of Acceptance and Use Scale (Preservice Teachers)	Kabakçi-Yurdakul, Ursavas & Becit-Isçitürk (2014)	Scale used to measure preservice teachers' acceptance and use of technology.
Self-Directed Learning Readiness Scale	Guglielmino (1978)	Scale used to measure the complex of attitudes, abilities, and characteristics that comprise readiness to engage in self-directed learning.

Item Development

After collecting several existing instruments measuring aspects of DL, motivation, and self-regulated learning, I rephrased items from the instruments to directly relate to DL use. For example, one item from Thomas' (2013) *Reading Maturity Survey* asks participants the degree to which they agree with the statement "I enjoy reading to learn". This question was rephrased as "I enjoy using technology to learn". The resulting item bank consisted of 97 possible items. I removed redundant items and items not relevant for teacher research. For instance, Wigfield and Guthrie's (1995) *MRQ* included "I know I will do well in reading next year". Even when rephrased for DL, the item did not fit with this study.

The developed instrument contained 60 items aimed to measure digital learning identity (DLI). Using the *Reading Maturity Survey* as a model, each of the items provided a statement about technology use and asked the participants to rate statements on a scale of 1 to 5. Selecting

1 indicates that the statement is “not like me” and selecting a 5 indicates the statement is “a lot like me”.

Theoretical Validity

To validate the theoretical underpinnings of each item, I used Greene and colleague’s (2014) critical components of DL (i.e., self-regulated learning and epistemic cognition) as well as Wigfield and Guthrie’s (1995) dimensions for reading motivation (i.e., efficacy, challenge, curiosity, aesthetic enjoyment, importance, recognition, social, competition, compliance, and work avoidance). Considering the complexity of DLI, aspects of both DL and reading motivation need evaluated for full survey validation. I coded each survey item for fit within one component. For example, I coded “I often use technology to learn concepts that are relatively difficult” as *Challenge* due to verbiage related to a challenging concept.

Initial coding results indicated 52 of the 60 items met the original constructs for DL components. The remaining eight items were reworded to meet the components set by Greene et al., (2014). For example, survey item D10 original stated, “Technology links to new ideas” and was reworded to “I construct new ideas from what I learn while using technology”. In total, after the theoretical coding, I determined six potential factors within the survey items; self-regulated learning, challenge, goals, knowledge achievement, importance, and attitude (see Figure 2).

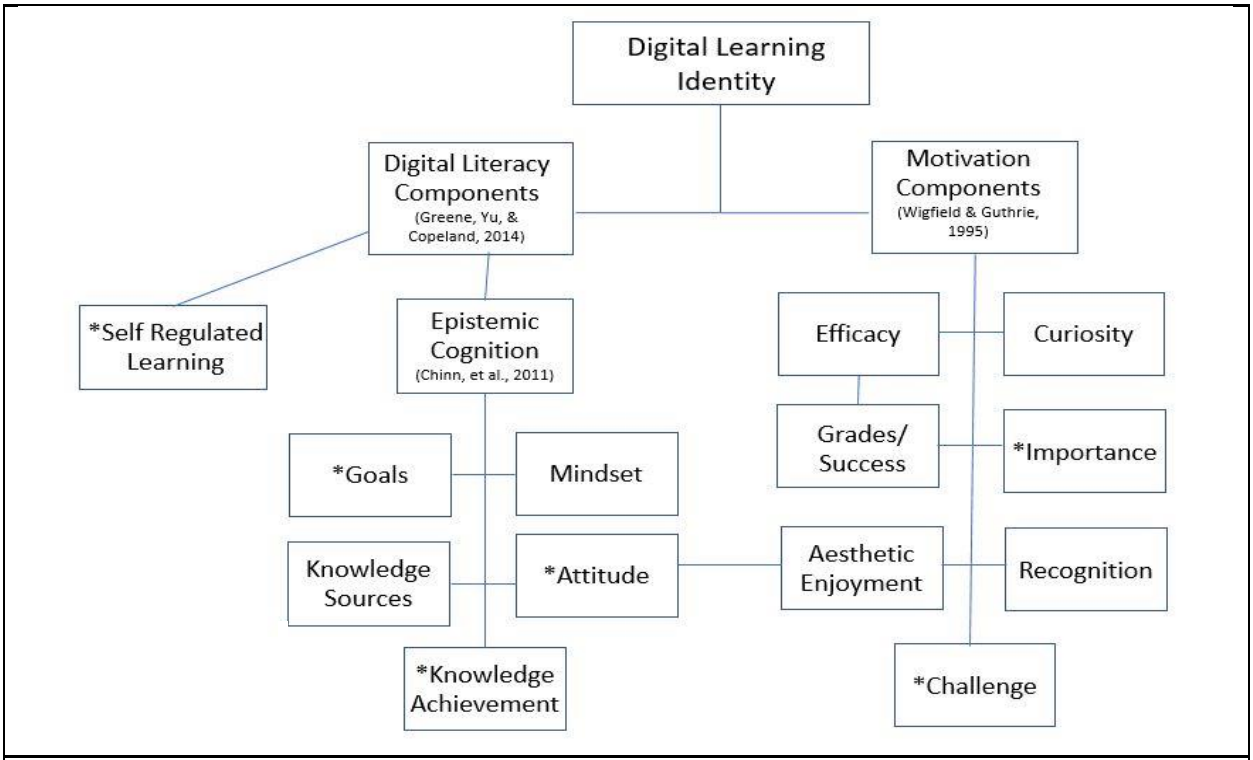

Figure 2. Hypothesized Model of Factors Influencing Digital Learning Identity
Items marked with an asterisk (*) were included in the initial theoretical coding.

Administration Procedures

I administered the *DLIS* to two groups of participants to try to decrease homogeneity within an extremely homogenous group of pre-service teachers, namely in gender and race. In total, 206 pre-service teachers participated in the study. In both instances, the administration time was approximately 15 minutes.

Survey Administration

Administration of the *DLIS* occurred in the first month of the fall semester at a public university in the southwestern United States. After obtaining university-level Institutional Review Board approval, I administered a digital version of the *DLIS* to pre-service teachers in a teacher preparation program. The 206 pre-service teachers surveyed included those registered in the teacher education coursework, present at the time of administration. Pre-service teacher

demographics varied based upon level of coursework, but the courses were required for all pre-service teachers in the university's teacher education program. The courses included four sections of an educational technology course and two sections of a senior methods reading course.

The survey began with an assent statement informing pre-service teachers of the voluntary nature of their survey participation. I explained the survey and data collection to each course section, giving the pre-service teachers opportunity to ask questions before beginning the survey. I stayed in the classroom until all participants completed the survey, allowing for questions and clarity. No preservice teachers asked questions during administration. In total, 99.35% of the participants provided assent and fully completed the survey. Table 2.3 shows the basic demographic information provided by participating preservice teachers.

In addition to demographic questions informing gender, ethnicity, and college classification, the survey also asked participants to indicate the number of hours (per week) they used technology for personal reasons, the number of hours (per week) they used technology for professional reasons, and if they used technology more for producing content or consuming content (see Table 2.3).

Table 2.3

Participant Descriptive Information

	Total	206	Percentage
Gender	Males	6	2.9%
	Females	199	96.6%
	Gender not reported	1	0.4%
Ethnicity	White	118	57.3%
	African American	49	23.8%
	Asian	9	4.4%
	Latina/x	27	13.1%
	>1	3	1.5%
College Level	Freshman	2	1.0%
	Sophomore	57	27.7%
	Junior	68	33.0%
	Senior	79	38.3%
Personal Tech	0-1 hour	5	2.4%
	2-3 hours	77	50.5%
	4-5 hours	69	33.5%
	>5 hours	55	26.7%
Professional Tech	0-1 hour	13	6.3%
	2-3 hours	104	51.3%
	4-5 hours	66	32.0%
	>5 hours	23	11.2%
Purpose	Production	51	24.8%
	Consumption	155	75.2

Psychometric Validity

I conducted an exploratory factor analysis (EFA) to determine the number of common factors within the *DLIS* items and which measured variables relate to each factor (Raykov & Marcoulides, 2011). The EFA analysis was used to find the psychometric model-of-best fit. The EFA was then compared with the *a priori* theoretically based model identified during item coding (described above). This process enabled construction of a model with strong psychometric and theoretical validity. Lastly, I calculated the Pearson's r two-tailed correlations

between participant demographics and all *DLIS* variables to analyze external validity of the *DLIS* variables.

Correlation Analysis

Pearson's r two-tailed correlations calculations were conducted between participant demographics and all *DLIS* variables. I hypothesized the *DLIS* variable *Efficacy* and time using technology for personal and professional use would overlap due to increased levels of comfort with technology based upon perceptions of technological competence (i.e., Expectancy Value Theory). Additionally, I hypothesized *DLIS Efficacy* would overlap with the remainder of the *DLIS* categories (i.e., *Knowledge Sources, Knowledge Achievement, Self-Regulated Learning, Attitude,* and *Challenge*) as perception of efficacy underlies other aspects of someone's DLI. Identifying as a digital learner comes from various factors, but arguably, efficacy for digital learning leads to increase in other areas of digital learning.

Results

In the following sections, I outline the results by statistical analysis. First, I explain Pearson r correlation analysis. Next, I detail the split-half reliability and Cronbach's alpha results. Then, I describe the EFA and CFA models and results. These procedures comprised the structural component of the validation process (Benson, 1998). Finally, I explain the reliability components for completion of survey reliability. All analyses were conducted using SPSS and STATA software.

Correlation Analysis

To test the external validity of the *DLIS,* I calculated the Pearson's r two-tailed correlations between measured DL variables, including all six *DLIS* constructs (i.e., *Knowledge Sources, Knowledge Achievement, Self-Regulated Learning, Efficacy, Attitude,* and *Challenge*)

(Table 2.4). Demographic variables (e.g., gender, race, and age) were not included in the correlation analysis due to lack of variability in the participant demographics. The purpose of this analysis was to examine the similarities between the variables I developed to measure DLI and to determine overlap between a teachers' reported competency in all factors. All correlations of *DLIS* variables were significant at the 0.01 level, indicating a match between all measured aspects of a teacher's DLI.

Table 2.4

Correlations Between Teacher Self -Reported Scores on Measured Variables

	Personal Hours	Professional Hours	Tech Age	DLIS Attitude	DLIS SRL	DLIS Efficacy	DLIS Know Achievement	DLIS Challenge	DLIS Know Sources
Personal Hours	1								
Professional Hours	.198*	1							
Tech Age	-.211**	-.080	1						
DLIS Attitude	.221**	.138	.368**	1					
DLIS SRL	.089	.082	-.272**	.614**	1				
DLIS Efficacy	.173*	.027	-.091	.575**	.464**	1			
DLIS Know Achievement	.037	.171*	-.185	.597**	.676**	.557**	1		
DLIS Challenge	.069	.121	-.301**	.670**	.707**	.556**	.701**	1	
DLIS Know Sources	.065	.101	-.292**	.533**	.615**	.439**	.640**	.641**	1

** Correlation is significant at the 0.05 level (2-tailed)*
*** Correlation is significant at the 0.01 level (2-tailed)*

Statistically significant results at the 0.01 level also exist for personal hours of technology use overlapping with technology age and *DLIS Attitude*. Personal hours of technology use also

demonstrated significantly significant results at the 0.05 level with professional hours of technology use and *DLIS Efficacy*. Hours spent using technology for professional use and *Knowledge Achievement* correlate with statistically significant results at the 0.05 level. Lastly, the age a participant started using technology for learning purposes (technology age) demonstrated statistically significant results at the 0.01 level for four of the *DLIS* variables (*Attitude, Self-Regulated Learning, Challenge,* and *Knowledge Sources*).

Reliability Analysis

A split-half reliability analysis was conducted in STATA using the 60 *DLIS* test items. When the items were divided into even and odd groupings, each half contained 30 items. After splitting the items, even and odd groupings were correlated and used to calculate a Spearman-Brown reliability estimate. The result was a 0.955 estimated reliability. Spearman-Brown assumes all survey items are parallel, so split-half analysis must be conducted to apply the Spearman-Brown formula in a situation in which items are not all parallel (Raykov & Marcoulides, 2011), given the reliability of unweighted composite of parallel items. Spearman-Brown formula provides an arguably stronger reliability coefficient (Raykov & Marcoulides, 2011).

Upon completion of Spearman-Brown analysis, I calculated Cronbach's alpha for an additional estimate of reliability. The *DLIS* returned a Cronbach's alpha of 0.935, showing high reliability of the scores within the test items. This finding indicates over 90% of the variance in responses can be attributed to true human variance and not measurement error (Cumming, 2012).

Exploratory Factor Analyses

Using the same 60 test items as before, the process began to conduct EFA's on the *DLIS* items using SPSS. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was 0.827,

classified as a meritorious value, and the Bartlett sphericity test was less than 0.000, indicating the null hypothesis could be rejected and continuing with a factor analysis was appropriate for this data.

Multiple EFA's were then conducted with Varimax rotation. I created a scree plot to determine the criterion for factor selection to begin the EFA analysis. The scree plot resulted in 12 possible factors. Additionally, a parallel analysis was conducted, determining the number of factors to retain from factor analysis as 17. Multiple Principal Components Analyses (PCA) with Promax rotation were conducted for further analysis.

To find the model best fitting the data, seven EFA models were tested (see Table 2.5), starting with those models based upon statistical results and moving to models based in theory. Testing both hypothesized and rival models involves an essential step to the structural component of a validation program (Benson, 1998). A detailed summary of each EFA follows. While the decision to remove items was guided primarily by psychometric data, each item was simultaneously considered for conceptual fitness as well as potential issues of wording, which possibly causes a "not good fit". Additionally, I analyzed survey items for similarities to determine relationships not related to quantitative analysis.

Table 2.5

Summary of EFA Models

EFA #	Description	Number of Survey Items	Number of Factors	Mean items per factor	Percent Variance Explained
1	Eigenvalues over 1	60	17	3.35 (3.35)	69.942
2	Repeat EFA #1, removing items with structure coefficients <.4	56	15	3.87 (3.34)	68.616
3	Forced 10 factors	56	10	5.5 (3.24)	58.408
4	Repeat EFA #3, removing items with structure coefficients <.4	55	10	5.3 (3.33)	58.861
5	Repeat EFA #4, removing items with structure coefficients <.4	54	10	5.4 (3.34)	59.250
6	Repeat EFA #5, removing items with structure coefficients <.4	53	10	5.3 (3.37)	59.630
7	Repeat EFA #6, removing items with structure coefficients <.4	52	10	5.3 (3.37)	60.177

Note: When appropriate, standard deviations are displayed next to means in parentheses.

EFA #1

The model was first examined including all factors with eigenvalues over one. This structure yielded seventeen factors and explained 69.94% of the total variance (See Table 2.5). However, many factors had few items, and nearly half of the variance explained (30.1%) was accounted by the first two factors.

EFA #2

The first EFA analysis was repeated removing any survey items without a structure coefficient of at least 0.4 on any factor. Item removal left 55 items remaining and yielded a model with 15 factors explaining 68.62% of the variance. However, many factors had few items, and nearly half of the variance explained (31.2%) was accounted by the first two factors.

EFA #3

Examining the results of EFA #1 revealed the first ten factors contained 56.54% of the total variance explained. Therefore, it was hypothesized a ten-factor model could be a strong fit for the data. An EFA was conducted, forcing the items into ten factors. This model explained 58.408% of the variance, but some items with low structure coefficients remained.

EFA #4

Next, one item from EFA #3 with low structure coefficients was removed, and the analysis was repeated. This analysis resulted in 58.86% of the variance explained and indication of many theoretically similar items aligned on the same factor.

EFA #5

Upon results of EFA #4, one item with a low structure coefficient was removed for a repeat analysis. This analysis resulted in 54 items, explaining 59.25% of the variance. The factors began to more closely align based upon both DL aspects and learning through reading. Results demonstrated one potential item for removal.

EFA #6

Removal of one additional item led to a 10-factor analysis explaining 59.63% of the variance. With one additional item demonstrating a low structure coefficient, the decision was made to conduct one additional EFA to determine model of best fit.

EFA #7 (Model of Best Fit)

Finally, an examination of the items removed in each iteration led to discovering the eight removed items did not factor well in any of the models. These eight items identified as potentially problematic as they could be confusing. These items were removed and the 10 factor EFA was repeated. The resulting model explained 60.17% of the total sample variance. The

details of the properties of the ten factors are displayed in Table 2.6, and the structure coefficients for the included items in Appendix A. Now consisting of 52 items, the *DLIS* yielded an overall Cronbach's α of 0.931. Of equal importance, the Cronbach's alpha of each scale was considered. Four scales had coefficients in the acceptable range (> 0.70), four scales had coefficients close to the acceptable range (0.60 - 0.69), and two scales had low coefficients. However, these scales also had only few items, 2-4, and calculations of Cronbach's alpha are affected by sample size. In total, for the first iteration of a new scale, the factor reliability coefficients show reasonable reliability and guide revisions.

Table 2.6

Factor Properties

Factor	Items *n*	Eigenvalue	Total Variance Explained (%)	Cronbach's α
1	10	13.081	25.16	.898
2	10	3.759	7.23	.901
3	10	2.712	5.22	.875
4	5	2.040	3.92	.796
5	4	1.903	3.66	.632
6	3	1.870	3.60	.641
7	4	1.625	3.13	.522
8	2	1.546	2.97	.620
9	2	1.445	2.75	.647
10	3	1.312	2.52	.450
Overall Scale	52		60.18	.931

Handling Problematic Items

After conducting the EFA and determining eight original items did not fit correctly into the assessed components (see Table 2.7), I contacted four survey participants to give insight into the ineffectiveness of the eight removed items further. For all eight items, the consensus was the items were confusing, and the participants did not understand the concepts asked. For example,

the intent with QE9, “I am intellectually enriched by most of what I learn using technology” was to determine further if participants were learning what they perceived as valuable information from technology. Participants interpreted the question as asking if technology made them excited to learn. This realization led to a decision on whether to reword or eliminate each item. Upon further investigation, rewording four of the eight items better fit the survey’s theoretical structure. Possible factor inclusion for the rewarded items was predicted based upon previous analysis (Table 2.7).

Table 2.7

Deleted Survey Items

Original Survey Item	Decision	Rewording (if applicable)	Factor
I use technology flexibly.	Delete	NA	NA
When I use technology to learn, I often think of other things that I already know about the topic.	Delete	NA	NA
Technology prompts me with new ideas and insights.	Reword	Things I learn with technology makes me think of things I have never thought of before.	Self-Regulated Learning
I often make generalization and personal conclusions when using technology to learn.	Reword	I often make decisions about things when I use technology to learn.	Knowledge Achievement
When I use technology, I combine ideas I already have with ideas that I learn to form new personal understandings.	Delete	NA	NA
I use technology with an inquiring attitude.	Reword	I question information I receive using technology.	Curiosity
I ask myself questions while I use technology.	Delete	NA	NA
I am intellectually enriched by most of what I learn using technology.	Reword	I gain knowledge by most technology I use.	Knowledge Achievement

Parallel Analysis

Table 2.8 provides the eigenvalues greater than one and the parallel analysis scores for each factor at the 95th percentile. The first eight factors have eigenvalues greater than one and greater than the 95th percentile scores for the parallel analysis. This result indicates the factors are significant and appropriate to retain. According to our model of best fit, the ninth and tenth factor should also be retained; however, the eigenvalues are less than one but greater than the 95th percentile scores for the parallel analysis. This analysis suggests a ten-factor model best fits the data.

Table 2.8

Parallel Analysis Results

Component	Principal Components Analysis Eigenvalue	Parallel Analysis (95th Percentile)
1	12.260	1.438
2	3.397	1.333
3	2.259	1.236
4	1.529	1.149
5	1.315	1.064
6	1.114	.991
7	1.058	.908
8	1.008	.853
9	.980	.796
10	.760	.752

Resulting Factors

The ten-factor best fit model (Appendix B), further explains the survey items by grouping them into like categories. Upon analysis of factor loadings, each factor was given a name (see Table 2.9) based upon the DLI components (Figure 2).

Table 2.9

Version 1 Factor Names and Descriptions

Factor	Factor Name	Description
1	Knowledge Sources	Technology as a source to personally reflect on attained knowledge
2	Efficacy	Perception of technological proficiency
3	Attitude	Importance of technology use for learning purposes
4	Goals	Reasons attributed to technology use for learning purposes
5	Knowledge Achievement	Using technology for higher purposes of learning
6	Importance	Prioritization of technology use for learning purposes
7	Self-Regulated Learning	Monitoring own learning with technology
8	Challenge	Technology use for learning difficult concepts
9	Mindset	Perception of value in using technology for learning
10	Curiosity	Using technology to understand others

Psychometric Summary: Convergent Results & Model of Best Fit

During initial instrument development, I hypothesized the *DLIS* would measure six factors related to using technology for higher purposes of learning, namely: *self-regulated learning, challenge, goals, knowledge achievement, importance, and attitude.* This model was grounded in both knowledge of the theory underlying these affective constructs, and experience with teaching DL integration to both preservice and in-service teachers.

The model-of-best fit suggested a ten-factor model, based on the EFA and parallel analysis, would explain the most variance in the data while aligning like-items. Most importantly, the resulting 52 items correlated logically and aligned with existing theory (see

Appendix B), including both elements of DL and reading motivation needed for digital identity development.

Survey Refinement — Version 2

Upon reflection of Version 1 results, I decided to focus more specifically on learning identity. Guglielmino's (1978) *Self-Directed Learning Readiness Scale* was influential in determining items effective in measuring learning identity from a self-directed learning approach, also called self-regulated learning (Zimmerman**,** 1990). Aspects of self-regulated learning indicates knowledge of how to monitor your learning (Bjork et al., 2013) by tracking areas of strength and weakness, and working to further develop weak areas for personal achievement and growth **(**Greene et al., 2014**).** Self-regulated learning incorporates learning and motivation in an interdependent process not fully understood apart from each other (Zimmerman, 1990). Self-directed learning is applicable for *DLIS* survey development based on elements of adult education linked to personal learning as study participants are adult learners (Figure 3).

Using Guglielmino's (1978) scale as a guide, I included all original eight items, either reworded or deleted during *DLIS* Version 1, with further rewording of each item to reflect a more self-directed learning tone (e.g., "Technology prompts me with new ideas and insights" was changed to "Things I learn with technology makes me think of things I have never thought of before"). I then administered *DLIS* Version 2 to the same participants as Version 1.

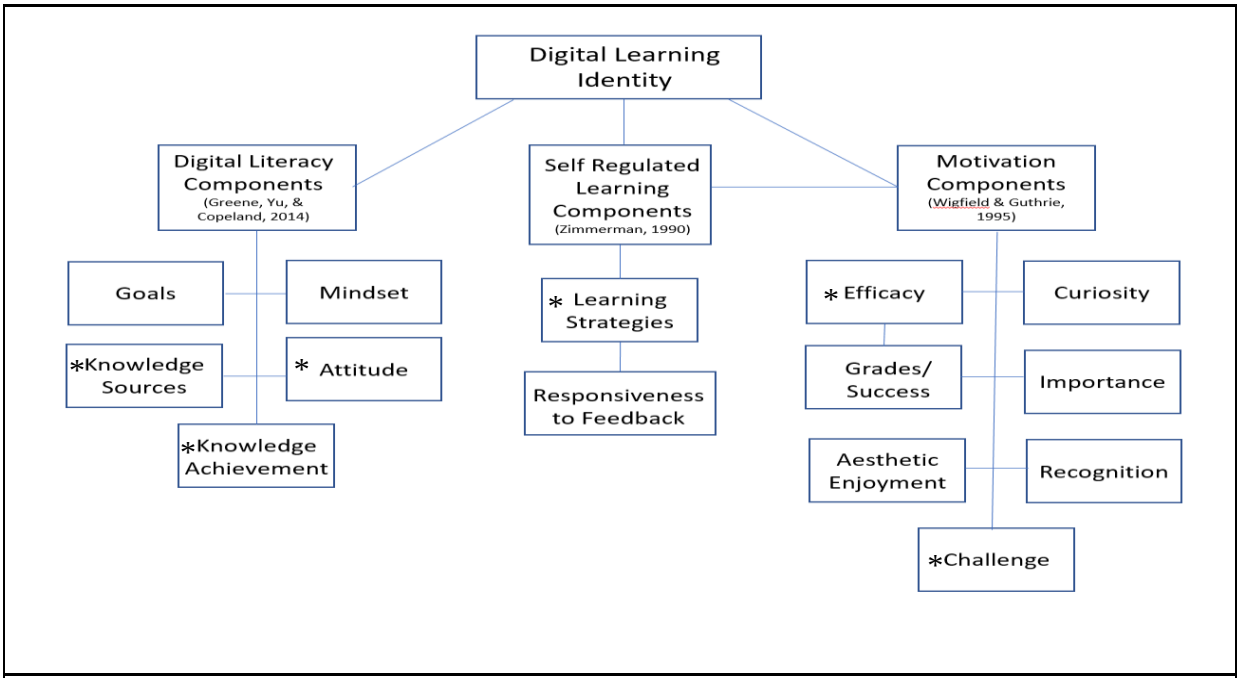

Figure 3. Refined Survey Framework with Identity Components
(Items marked with an asterisk indicate final version factors.)

Exploratory Factor Analyses

Upon administration of *DLIS* Version 2, with the new framework in mind, a second round of EFA's, using SPSS, were conducted to find a best fit model based upon the survey data. Using the original 60 test items, reworded based upon participant feedback and Guglielmino's (1978) work, the process began to conduct EFA's on the redeveloped *DLIS* items. The new analysis indicated the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was 0.919, classified as a marvelous value, and the Bartlett sphericity test was less than 0.000, indicating the null hypothesis could be rejected and continuing with a factor analysis was appropriate for this data.

Exploratory Factor Analyses (EFA) were then conducted with Varimax rotation. A scree plot was created to determine the criterion for factor selection to begin the EFA analysis, (Figure

4). The scree plot resulted in seven possible factors. Additionally, a parallel analysis was conducted, determining the number of factors to retain from factor analysis as four (Figure 5).

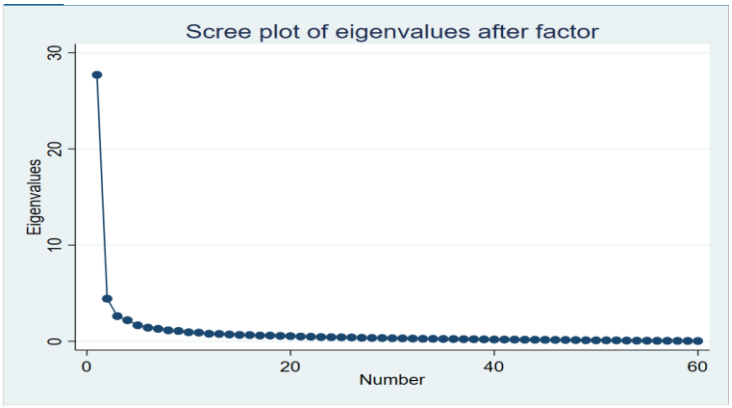

Figure 4. Scree Plot Analysis

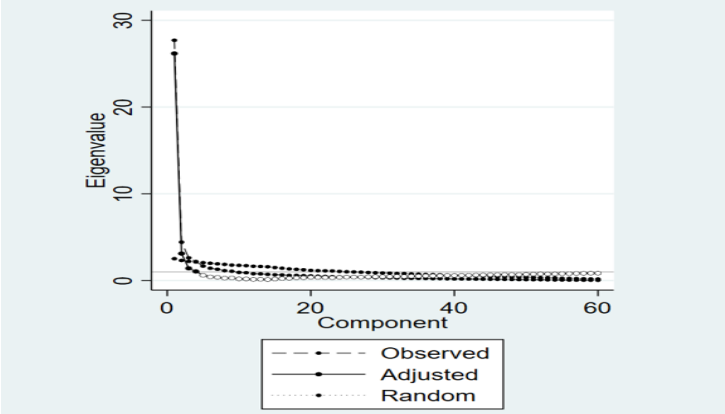

Figure 5. Parallel Analysis

With results of both the scree plot and the parallel analysis, to find the model best fitting the data, an EFA model was then tested. The model was examined including all factors with eigenvalues over one. This structure yielded nine factors, explaining 72.59% of the total variance

(See Table 2.10), and contained no structure coefficients less than 0.45. Such coefficients indicated one EFA was sufficient for this analysis. The mean number of items per factor was 7.5. The *DLIS* yielded an overall Cronbach's α of 0.978. Of equal importance, the Cronbach's alpha of each scale was considered. All scales had coefficients in the acceptable range (> 0.70), showing strong reliability for current revisions.

Table 2.10

Factor Properties

Factor	Items *n*	Eigenvalue	Total Variance Explained (%)	Cronbach's α
1	10	27.697	15.933	.905
2	10	4.432	14.882	.947
3	10	2.621	11.684	.930
4	10	2.196	10.346	.929
5	10	1.665	5.432	.928
6	5	1.423	5.256	.908
7	2	1.302	3.834	.790
8	3	1.143	3.145	.857
9	0	1.079	2.085	NA
Overall Scale	60		72.59	.978

Starting with this model based upon statistical results, survey factors were next evaluated based in theory. Fifty of the original 60 items loaded cleanly onto five factors, with the remaining ten items loading onto three factors (Appendix C). Upon evaluation of the remaining ten items, theoretically the wording of each item linked to learning challenging material. As such, I decided to combine these ten items into one factor, making the final model having six factors (Table 2.11), fitting well with the scree plot analysis of seven factors and the parallel analysis of four factors. The combined items have a Cronbach's α of 0.945, which is stronger

than the individual reliability scores. EFA analysis resulted in creation of *DLIS* Version 3, with items measuring hypothesized constructs detailed in Table 2.12.

Table 2.11

Version 2 Factor Names and Descriptions

Factor	Factor Name	Description
1	Self-Regulated Learning	Monitoring own learning with technology
2	Knowledge Sources	Technology as a source to personally reflect on attained knowledge
3	Attitude	Importance of technology use for learning purposes
4	Efficacy	Perception of technological proficiency
5	Knowledge Achievement	Using technology for higher purposes of learning
6	Challenge	Technology use for learning difficult concepts

Table 2.12

Hypothesized Constructs and Items Measured by the DLIS

Construct	Self-Regulated Learning	Digital Literacy	Motivation to Learn
Operational Definition	Knowing how to monitor your own learning (Bjork, Dunlosky, & Kornell, 2013)	Literacies that are, "multiple, dynamic, and malleable," linked to backgrounds and experiences. (NCTE, 2013)	Beliefs and efficacy related to a task influence engagement (Wigfield & Guthrie, 1995)
	1. I use technology for valuable reasons. 2. I use technology for pleasure. 3. I use technology to learn more about things that interest me.	1. I enjoy using technology to learn. 2. I have a high interest in using technology to learn. 3. I feel that learning with technology can be exciting.	1. I use technology proficiently 2. I understand most of the technology I use. 3. When I use technology, I feel like I get a good grasp of the literal

Table 2.12 Continued

Construct	Self-Regulated Learning	Digital Literacy	Motivation to Learn
Survey Items	4. I use technology to gain new knowledge. 5. I use technology to improve my understanding of life. 6. I use technology to understand others better. 7. I use technology to understand myself better. 8. I try to actively engage myself with the technology I am using. 9. I use technology with a purpose. 10. I use many different types of technology.	4. Using technology to learn can be stimulating. 5. Learning with technology is an important part of my life. 6. I use technology to learn frequently. 7. I have a wide variety (or breadth) of interest in technology for learning. 8. I like to use technology for many different things. 9. I use technology extensively to learn about certain topics. 10. I enjoy using technology to learn a lot about something that interests me. 11. When I use technology to learn, I often use background knowledge to understand new concepts. 12. Things I learn with technology makes me think of things I have never thought of before. 13. I often make decisions about things when I use technology to learn. 14. I use technology to help me make decisions about things.	meaning being presented. 4. I am comfortable with my technological ability. 5. I feel like I have the ability to see implied meaning when using technology to learn. 6. I don't mind demonstrating technology I use for others. 7. I feel like I use technology efficiently. 8. I feel like I can figure out how to use unfamiliar technology. 9. I am fluent in using technology for learning purposes. 10. If my technological abilities were assessed, I would show good basic technological ability. 11. I use technology to learn intellectually challenging material. 12. I use technology to learn that goes beyond simple understanding. 13. I use technology to learn things that make me think. 14. I use technology to learn rich material.

Table 2.12 Continued

Construct	Self-Regulated Learning	Digital Literacy	Motivation to Learn
Survey Items		15. When I use technology, I combine ideas I already have with ideas I learn to form new understandings. 16. I question information I learn using technology. 17. I ask myself questions while I use technology to learn. 18. I use technology to find supporting points to help me evaluate the main idea of what I learn. 19. When I am using technology to learn, I often recognize valuable ideas. 20. When I use technology to learn, I construct new ideas. 21. Technology often helps me change my perspective about things. 22. Technology often makes me want to make personal changes in my life. 23. When I learn something valuable from credible sources using technology, I usually apply it to the actions in my life. 24. Learning with technology can	15. I use technology to learn about things that stimulate my mind. 16. I use technology to learn concepts that are relatively difficult. 17. I use technology to help me better understand other people. 18. I use technology to broaden my understanding of the world. 19. I gain knowledge by most technology I use. 20. I use technology to learn things I didn't know before.

Table 2.12 Continued

Construct	Self-Regulated Learning	Digital Literacy	Motivation to Learn
Survey Items		transform my actions. 25. Learning with technology can transform my thinking. 26. Learning with technology can transform my values. 27. I can recall instances in which I have been personally transformed from things I learned using technology. 28. Technology makes me carefully consider changes I should make in my life. 29. Technology often causes me to be personally reflective. 30. Some of my character is shaped by what I learn using technology.	

Final Version Analysis

Version 3 data analysis (N= 339) began with an overview of item descriptive statistics (Appendix F). Overall, the mean and standard deviations for all 60 survey items were consistent, with the majority of items indicating participants were on the spectrum of disagreeing (mean = 1 or 2) or agreeing (mean=4) with the item, but a few inconsistencies remained. Namely, 20 of the 60 survey items included a mean of 3 on the rating scale. A score of 3 indicates participants

neither agree nor disagree with the item. Means of 3 in this Likert scale survey indicate potential wording discrepancies' in these three items, or an area possibly highly correlated.

A correlation matrix was created to give a more accurate picture of the survey items for analysis. As predicted above, 13 of the survey items with means around 3.0 showed a higher correlation with one another than most other survey items (0.9). Correlations show the relationship between survey items, with high correlations leading toward determinations of rotation with exploratory factor analysis. As most survey items showed correlations of below 0.7, these items do not show high correlations with one another, indicating a Varimax rotation could potentially be the best choice for this data.

Reliability Analysis

Upon analysis of descriptive statistics, I conducted a Cronbach's alpha analysis for an estimate of reliability. The *DLIS* returned a Cronbach's alpha of 0.941, showing high reliability of the scores within the test questions. This finding indicates over 90% of the variance in responses can be attributed to true human variance and not measurement error (Cumming, 2012).

Exploratory Factor Analyses

Using the 60 survey items, the process began to conduct EFA's on the *DLIS* items. Using a Principal Component Analysis to reduce the data set by forcing the smallest number of factors, an EFA was conducted to identify the underlying relationships between measured variables, determining if the measure was assessing what it was created to measure. Additionally, an oblique rotation was chosen, as descriptive statistics indicated the factors had some correlation.

EFA analysis results indicated nine factors had Eigenvalues greater than 1, with a scree plot indicating a possible best-fit model with seven factors (Figure 6).

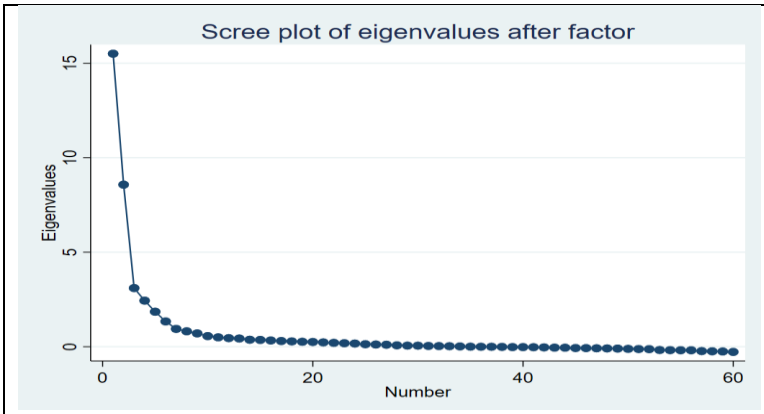

Figure 6. Final Version Scree Plot

Understanding Eigenvalue criteria can over extract the appropriate number of factors, a parallel analysis was conducted, determining the number of factors to retain from factor analysis as seven (Figure 7).

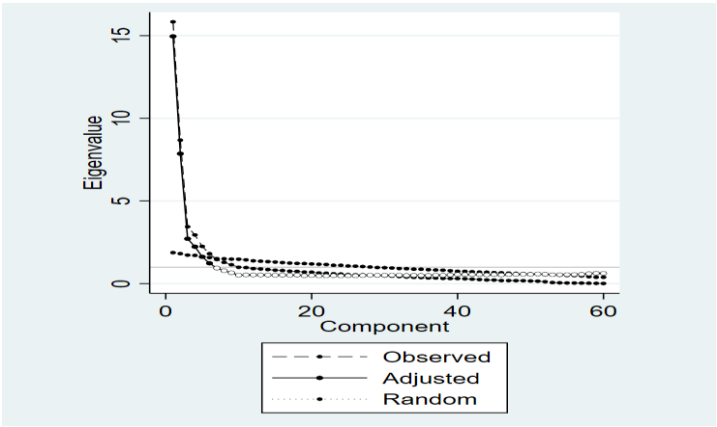

Figure 7. Final Version Parallel Analysis

Resulting Factors

Results demonstrated through EFA and parallel analysis, along with theoretical underpinnings, determined a six-factor model best fit the data, explaining the most variance in the data while aligning like-items. With these results, an additional EFA with oblique rotation was conducted, forcing the number of factors to six. This analysis produced six factors, showing relative uncorrelated loadings onto the six factors (Table 2.13). With 86% of the variance explained, results indicate a six-factor model best fits this data set (Table 2.13), and each factor accurately describing the six latent variables (knowledge sources, knowledge achievement, attitude, efficacy, challenge, and self-regulated learning) representing each factor based upon both theoretical and psychometric analysis (Appendix D).

Table 2.13

Factor Properties

Factor	Items *n*	Eigenvalue	Total Variance Explained (%)	Cronbach's α
1	10	15.504	40.68	.905
2	10	8.574	22.49	.992
3	10	3,103	8.14	.918
4	10	2.438	6.40	.821
5	10	1,851	4.85	.761
6	10	1.338	3.51	.932
Overall Scale	60		86.10	.881

Confirmatory Factor Analysis

Finally, a Confirmatory Factor Analysis (CFA) was conducted using STATA to determine whether the six-factor model fits the data well. The factor loading estimates indicated a relatively strong factor loading (Appendix E) and the chi^2 score indicated I should not reject the null, meaning this six-factor model accurately fits this data. Additionally, when analyzing fit

statistics, Root Mean Square Error of Approximation (RMSEA) values, which should range from 0.05-0.08, were 0.062. Confirmatory Fit Index (CFI) values were the weakest at 0.871, where acceptable values should be above 0.95. Lastly, Standardized Root Mean Squared Residual (SRMR) values came in at 0.05, where values below 0.05 are considered acceptable. For two of the three values, the reported values demonstrated through the CFA were in the acceptable range, further indicating this six-factor model best fits this data. Furthermore, when analyzing the residuals apparent in local fit indices, zero relationships show a high residual, indicating the factor loadings are accurate.

Discussion

After analysis, I drew three major conclusions: (1) the *DLIS* measures aspects of DL, motivation to learn, and self-regulated learning; (2) the *DLIS* produces reasonably reliable scores for DLI; and (3) the *DLIS* produces valid scores for DLI.

Digital Literacy Motivation Measured by the DLIS

To answer the first research question (*What aspects of digital learning identity are measured by the Digital Learning Identity Survey*), I evaluated the results of all EFA's. I hypothesized the Digital Learning Identity Survey (*DLIS*) measures aspects of self-regulated learning, attitude, mindset, knowledge sources, knowledge achievement, efficacy, curiosity, importance, and challenge as related to DL and motivation.

I based the model best fitting the data upon a combination of theory and psychometrics, incorporating factors of both DL, self-regulated learning, and motivation (see Figure 3). Six of the 14 total components comprising DLI accurately described the factor loadings (indicated with an asterisk in Figure 3), indicating the *DLIS* measures these six components. Of the six measured components, three (out of five) identified DL components described factors of DL (*Attitude*,

Knowledge Achievement, Knowledge Sources), one (out of two) self-regulated learning component was described (*Self-Regulated Learning* strategies), and two (out of seven) motivation components were described (*Challenge, Efficacy*). Accurately measuring aspects of each of the three overarching components (digital literacy, self-regulated learning, and motivation) demonstrates a thorough analysis of factors contributing to DLI. Motivation remains the weakest area measured by the *DLIS*, but as motivation overlaps with self-regulated learning components, self-regulated learning items encompass some aspects of motivation.

Reliability of Scores for the DLIS

The *DLIS* was developed to measure teachers' ability to use DL for higher purposes of learning. The purpose in creating and validating this specific instrument was to examine the implications for teacher education. Reliability is necessary for score validity (Thompson, 2003). Therefore, to answer research question #2 establishing the reliability of the scores produced by the *DLIS*, I examined both the individual factors and overall reliability coefficients. I hypothesized the reliability of the scores of the *DLIS* will fall within the same range as previously recorded research with the entire survey and each common factor containing a Cronbach's α of 0.7 or higher. The individual factor scores yielded Cronbach's α reliability coefficients ranging from 0.761 to 0.992, indicating the scales were highly reliable. Scores related to *Knowledge Achievement* had the lowest relative reliability coefficient. The overall reliability coefficient (α=0.881) indicates over 80% of the variance in responses as attributable to true human variance and not measurement error (Cumming, 2012). This result indicates the *DLIS* produces reliable scores for the various factors.

Validity of Scores for the DLIS

Self-reported data (i.e., *DLIS* scores) are subject to validity threats, and as such, it is

essential to compare the results of measures using self-reported data (Mundai, 2011). To answer research question #3, establishing the validity of the scores produced by the *DLIS*, I examined correlations of teachers' self-reported scores.

I calculated the Pearson's r two-tailed correlations between technological age (age participants began using technology), time spent using technology, and all *DLIS* variables. Technological age was negatively correlated with both DLIS variables of A*ttitude* and *Knowledge Achievement*, indicating an inverse relationship exists between the age a teacher begins to use technology to learn and the attitude they have toward DL as well as their knowledge of DL (i.e., a teacher who has more positive experiences with DL will have a better attitude toward DL use and stronger DL understanding). This correlation result confirms research explaining a logical connection between experience and education (Casey & Bruce, 2011; Dewey, 1938; Gruszczynska et al., 2013; Jolls, 2015; Wigfield & Eccles, 2000), as experience potentially impacts attitude toward and knowledge associated with DL use. Such a logical connection adds validity to the *DLIS* highlighting Dewey's (1938) Theory of Experience — the quality of teachers' experiences regarding DL effects their education much more than quantity.

Next, to determine if overlap existed between *DLIS Efficacy* and time using technology for personal and professional use I calculated correlations between *DLIS Efficacy* and technology use. While efficacy is often perceived, such perception can increase confidence and risk taking regarding DL use. Similar to technology age, efficacy demonstrated statistically significant correlations regarding personal technology use but not professional technology use. These results indicate a positive relationship between efficacy and the time teachers spend using technology for personal learning. Since professional learning was not statistically significant, other factors may play a role in teachers' motivations to use technology for professional learning. This

relationship makes sense because the questions on the *DLIS* focus on one's overall use of technology are not limited to use of technology at work.

These findings indicate the *DLIS* validly measure DLI, specifically, factors related to DL and self-regulated learning components (Greene et al., 2014) adequately measured the desired survey components. Motivation components (i.e., *Challenge*) (Wigfield & Guthrie, 1995), while originally theoretically validated in instrument development, did not load onto unique factors or produce statistically significant correlation results, possibly indicating either the survey items were not worded as strongly toward motivation as originally determined, were overlapping in the self-regulated learning factors, or, motivation, having multiple components and some connectedness, requires further differentiation of each component.

To develop a measure, it is important to conduct a strong validation program, because only through this process will the scores take on meaning (Benson, 1998). Validation was accomplished for the *DLIS* by establishing the substantive, structural, and external components. Following these procedures and analysis, it was possible to establish the *DLIS* provides a valid measure of teachers' DLI.

Despite validation procedures, limitations remain. I collected all data for this study from one geographic region, specifically one university. Thus, researchers should collect similar data from a more diverse sample and analyze it before generalizations regarding digital learning trends can be made. Additionally, collecting data from a larger population will lead to a stronger understanding, guiding further statistical analysis.

Furthermore, the use of other sources may be beneficial to more fully validate the scale (e.g., predictive validity). For example, teachers previously identified as strong technology users

and technologically avoidant would take the survey. Another option includes teachers completing another assessment — such as Leu & Coiro's ORCA assessment (Leu, Kulikowich, Sedransk, & Coiro, 2009) — to determine if a correlation exists.

Initially, I planned to provide a qualitative piece to this study using open-ended questions asked in the *DLIS* post-survey. Upon analysis, the participants' responses did not inform the results as they connected more to Study II and the effectiveness of the coaching model of PD.

Furthermore, as some of the constructs represented in the DLIS are vague or subject to interpretation, participants potentially become confused on the actual meaning of a construct (e.g., digital literacy). To minimize confusion, future researchers should create an educational piece for participants that establishes construct definitions before administering the DLIS.

Lastly, while correlation results informed the study results, running correlations across multiple variables can potentially cause issues. In future work, for establishing more rigorous validity, researchers should consider the potential for scores on the DLIS to be predicted by theoretically determined demographic variables.

The *DLIS* is a tool teachers, administrators, and researchers can use to assess DLI. Better recognition of DLI will potentially lead to transfer of using technology for higher purposes of learning from self-reflection to actual integration. From a teacher perspective, such recognition will potentially lead to better classroom DL integration. For administrators and researchers, further recognizing teachers' DLI will assist in developing PD and resources linked to increasing DLI for enhanced classroom integration.

Future research needs to identify PD and resources leading to further development of teachers' DLI. Additionally, research needs to be conducted on how recognizing students' DLI

will influence technology integration and assist teachers in creating authentic DL experiences. As 21st century education continues to change, we must focus less on teaching elements of technology and more on transferring DL skills and resources to classrooms. While the *DLIS* is not the complete solution to lacking classroom technology integration, self-identification and stronger understanding of how we individually use technology for higher purposes of learning, leading to our digital identity, it is a first step towards changing mindsets regarding technology integration and creating confidence in ability linked to DL

Conclusion

Digital literacy includes the ability to read, write actively, and communicate (speaking, listening, and viewing) appropriately using digital tools and resources to identify, access, manage, integrate, evaluate, analyze, and synthesize multiple streams of simultaneous information. DL occurs in a manner that authentically constructs new knowledge, critiques current information, and allows for building connections with others for problem solving through collaboration to strengthen meaning and independent thought.

The purpose of this study was to expand upon the line of research by developing and validating a measurement tool, the *Digital Learning Identity Survey*. My results indicate aspects of the *DLIS* validly measure DLI, with factors related to DL, self-regulated learning, and motivation measuring the desired survey components. These findings suggest the *DLIS* is useful in assisting teachers to become more aware of their DLI and growth associated with digital learning based upon methods they choose to enhance their learning. Together, the findings of this study suggest the *DLIS* is a tool shown to assist teachers in becoming more aware of their identity as a digital learner and allows them an opportunity to see growth in areas of their DLI they feel should be enhanced based upon their need and their students' needs.

CHAPTER III

ORGANIZATION CHANGE THROUGH INDIVIDUAL CHANGE: TEACHERS' DIGITAL LEARNING GROWTH AS A RESULT OF PROFESSIONAL DEVELOPMENT

Introduction

In 2010, the National Education Technology Plan (NETP) delivered a call to action emphasizing the need to leverage technology to improve learning (United States Department of Education, 2010). In this same plan, the United States Department of Education coupled this call with increased need for connected teaching. Connected teaching takes teaching to a level where it is a team endeavor, filled with continuous methods for collaboration and professional growth. With an update to the plan in 2017, the NETP further emphasized using technology (i.e., Digital Literacy) to transform learning with teachers and teacher education as the main audience for this call (United States Department of Education, 2017).

Although teacher education programs have been teaching Digital Literacy (DL) for over two decades (Lei, 2009), with this increased emphasis, one would expect to see a difference in the quality and quantity of classroom DL integration. To date, K-12 classroom practices do not clearly reflect changes in teacher education because a gap still exists between student use and teacher DL integration (Schneider, 2015). I argue that Increasing DL integration knowledge — tools, facilitation, and assessment — is insufficient. DL education should also focus on assisting teachers in recognizing and enhancing their strengths with DL, particularly they use DL to learn. In doing so, we attribute the process of reflection and application to an increase in value and competency as teachers reflect on their identity as learners and users of technology (Hobbs & Tuzel, 2017; Kalman & Guerra, 2013).

Currently, most research in DL competency and integration focuses primarily on students as learners (Hall et al., 2014). Teacher focused research highlights teachers' approaches to teaching DL and not using DL to learn. Arguments advance the need for digitally literate students, but for classroom transfer to occur successfully, students need digitally literate teachers as well (Jolls, 2015). This study addresses the concern by creating a coaching model of professional development (PD) to increase teachers' digital learning identity (DLI), leading to a potential increase in classroom DL integration.

Digital literacy constitutes much more than skill in using technology. The term digitally literate emphasizes using technology critically, wisely, and meaningfully (Kivunja, 2014; Ladbrook & Probert, 2011; Lei, 2009; Maderick et al., 2016; Zhang, Hartley, & Marchand, 2016), taking basic technology knowledge and extending it to include the how and why to use technology for learning (Sharp, 2014). Meaningful learning includes tasks interrelated in an "authentic, constructive, active, cooperative, and intentional" manner (Alaniz & Wilson, 2015, p. 3). Many teachers demonstrate basic technology skills and can function in a technology driven society (Larson, 2008). Basic technology includes using technology more for consumption (i.e., gathering information) than for production (i.e., creating something with the information learned). However, concerns arise regarding staying relevant with technological advancements related to teaching and learning (Alaniz & Wilson, 2015).

With teachers demonstrating concerns over staying current with changing technology, coupled with often lacking PD focused on technology integration (Alaniz & Wilson, 2015), one possible solution to NETP's call is coaching. While many regard coaching as one of the more innovative approaches to PD, increasing in popularity in recent years, little research exists documenting its effectiveness (Smith, 2007).

This mixed methods study takes a coaching stance different from traditional PD. Through coaching, teachers are perceived as capable, logical, and high functioning people not reaching their full potential in the area of DL due to barriers. Teachers have the knowledge and skill set within themselves to become more capable and with support and empowerment teachers will reach higher levels of functioning.

Purpose

The purpose of this study is two-fold. First, I test the efficacy of a coaching model of PD for increasing teachers' personal DL. Second, I measure the extent that increasing teachers' DLI will increase their DL integration into classroom instruction. I summarize the research questions, hypothesis, data sources, and analysis of this study in Table 3.3.

Theoretical Framework and Models

This study uses the strong theoretical framework foundational to this dissertation (i.e., Andragogy, Expectancy Value Theory and Theory of Experience) (see Ch. II) to guide the design of PD and focus group questions, focused on what motivates teachers to change. For example, guided by Expectancy Value Theory (Wigfield & Eccles, 2000), I created the focus group question "When you try something new in your classroom, what inspires or motivates you to make this change?" to better recognize the influence of expectations and value behind classroom DL integration. I additionally ground this study on two models, Alaniz and Wilson's (2015) Collegial Coaching Model for Technology Integration and Project-Based Learning. Furthermore, standards for technology integration inform DL resources included in this study.

Collegial Coaching Model for Technology Integration

The Collegial Coaching Model for Technology Integration (Figure 8) is a cyclical model developed by Alaniz and Wilson (2015) to enhance technology-based coaching at the K-12 level.

Designed as an iterative process, the vision behind the model's creation includes revisiting all phases as needed throughout the coaching process and not used as a check-list for completion (Alaniz & Wilson, 2015). This model aligns well with the present study's purpose and provides a model for coaching necessary for study completion.

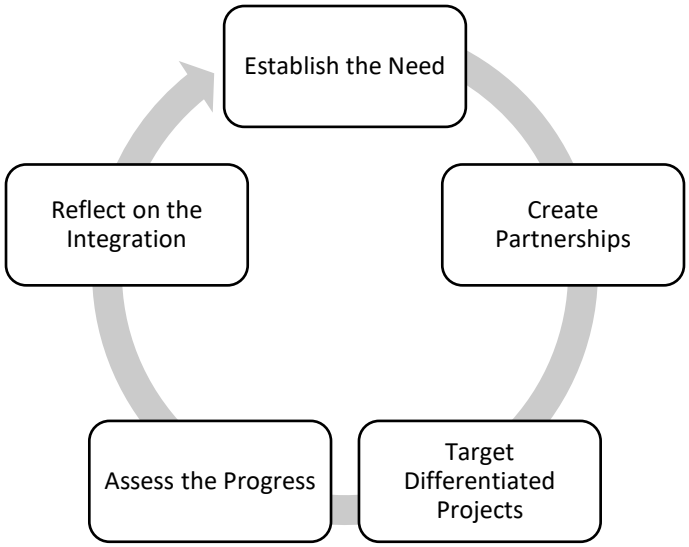

Figure 8. The Collegial Coaching Model for Technology Integration (reprinted from Alaniz & Wilson, 2015)

Project-Based Learning Approach

To enhance teacher learning, I frame PD in this study through a hybrid project-based learning (PBL) approach. Although K-12 classrooms routinely integrate PBL techniques with students, teacher education is rarely framed in a similar manner (Alaniz & Wilson, 2015). PBL combines theory, both social and cognitive, from Piaget and Vygotsky. Such learning uses real-life examples to pose authentic problems needing solved. I use a hybrid PBL approach in this study to make coaching more applicable in an effort to increase teachers' motivation to learn,

enhance their critical thinking skills through reflection and questioning, and increase their ability to transfer knowledge and self-awareness from their learning to classroom instruction. PBL, within the present study's confines, includes providing activities, resources, and videos often focused around a specific problem-based DL theme (e.g., evaluating content) (see Figure 9). Integrated DL concepts, while focused on specific learning tasks, grounded in standards established for technology integration to increase classroom application.

Hi, [Nancy]!

At this point in the study, you have spent some time reflecting on your own learning. With this in mind, today's resources look at lifelong learning. For this week, pick one (or more) of the resources below that you find most interesting and beneficial.

Activity:
1. Take the time to reach out to a colleague or peer you feel does a good job using technology to learn and talk to them about what they use/do. You may have done this activity before, but we learn so much from one another that it is good to continue this practice as lifelong learners.

Video:
1. Watch this video of my digital literacy story (https://youtu.be/E4g46b3HtfI). I spent some time reflecting on how I got to where I am using digital literacy to learn and the impact it has had on my path for lifelong learning. It honestly took longer to tell my story than I expected so you may be surprised by your story.
2. Reflect: What is your digital literacy story? How has it impacted your learning?

Research:

1. Visit this website: https://hbr.org/2017/01/make-learning-a-lifelong-habit
2. Reflect: Lifelong learning has been perceived as the key to success and happiness. I completely agree! Part of this study is recognizing how we learn using digital literacy, which in turn helps us refine our learning habits. Using this article as a guide, think about your learning habits. Do you follow the plan John Coleman establishes for lifelong learning? Where are you on the lifelong learning spectrum?

Figure 9. Example Activity, Video, and Research Personal Learning Resource Email

Standards for Technology Integration

The Common Core Standards, Texas Essential Knowledge and Skills (TEKS), and the International Society for Technology in Education (ISTE) provided standards appropriate for the PD created for this study (see Ch. II for information on Common Core and TEKS standards). ISTE provides standards for students and teachers to learn and productively contribute to both a global and digital environment (see Table 3.1).

Table 3.1

ISTE (2017) Standards

Educators should:	Continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning.
	Seek out opportunities for leadership to support student empowerment and success and to improve teaching and learning.
	Inspire students to positively contribute to and responsibly participate in the digital world.
	Dedicate time to collaborate with both colleagues and students to improve practice, discover and share resources and ideas, and solve problems.
	Design authentic, learner-driven activities and environments that recognize and accommodate learner variability.
	Understand and use data to drive their instruction and support students in achieving their learning goals.

Significance

Based on both their personal and professional experiences, teachers regard DL integration from various viewpoints. Similar to teaching any other discipline (e.g., science, math, history), when teachers recognize the how and why of what they teach, they will have a stronger level of confidence in teaching the content (Shanahan & Shanahan, 2008). For example, when teachers understand how they read (i.e., demonstrate meta-cognition), their ability to teach others to read

increases. Similarly, when teachers understand how they use DL to learn, their ability to teach students how to learn using DL enhances, increasing theirs and their students' DL competencies.

Many studies examine student DL competencies as well as strategies for implementing DL for classroom instruction (Bulger et al., 2014; Greene et al., 2014; Hargittai, 2009; Maderick et al., 2016; Ng, 2012; Pow & Jun, 2012). Fewer investigate teachers' ability to instruct with these tools and their comfort level using them (Gruszczynska et al., 2013**;** Hall et al., 2014). Teachers may be familiar with the use of various DL tools but often do not know how to integrate those tools for learning purposes (Underwood, Parker, & Stone, 2013). Additionally, while many teachers demonstrate personal DL skill use (i.e., using DL skills for personal learning), they lack knowledge of classroom DL integration as teachers often seem insecure and reluctant to integrate DL into their classrooms (Turbill & Murray, 2006). Furthermore, many teachers who integrate DL into classroom instruction view technology primarily as a method for engaging students during free time or as a reward (Turbill & Murray, 2006).

Teachers need to take available 21st century tools and help their students use them to learn. If we do not teach students to learn using DL elements and give them opportunities to create meaning through multimodal/multisensory techniques, they lack preparation to successfully participate in their future. DL instruction includes more than using computers to learn. Many computers sit unused in classrooms across the United States due to lacking confidence and skills obtained by the classroom teacher. This result is not the fault of the resources or teachers, but often the insufficient nature of instructional methods and PD provided to integrate these resources (Alaniz & Wilson, 2015). For teachers to effectively use DL for instruction, they must understand their literacy content (content knowledge), effective teaching techniques (pedagogical knowledge), and technology limitations (technological knowledge)

(Jacobs, 2013). One possible answer concerning the gap in teacher education and benefits linked to implementation includes recognizing teachers' personal DL use for learning purposes.

Considerations for Coaching

DL empowers learners to approach learning from a critical inquiry stance, gathering information from any format, making sense of the information, using it, and communicating learning in a manner unique to digital learning (Haynes-Moore, 2015; Hutchison & Woodward, 2014; Mihailidis & Cohen, 2013; Stripling, 2010). Such learning requires different skill sets than traditional learning (Hutchison, Beschorner, & Schmidt-Crawford, 2012). While DL can often be approached similarly to other learning methods (Wood, 2011), the application and development take on a different form. The following sections organize concepts influential in recognizing teachers' DLI as well as factors related to how teachers learn. Development and awareness regarding these factors remains necessary for successful PD integration. In the following sections, I review literature that informed the design of the PD for this study. I include literature informing elements of effective PD, as well as differences between traditional and coaching methods of PD because of the influence PD development has on the design of this study. Furthermore, I include additional factors for consideration in effective PD development. These factors include adult education influences, such as age and gender.

Coaching Versus Traditional Professional Development Methods

PD largely impacts classroom instruction and student achievement (Ball & Cohen, 1999; Cohen & Hill, 2000; Corcoran, Shields, & Zucker, 1998; Darling-Hammond & McLaughlin, 1995; Elmore & Burney, 1997; Guskey, 2002; Guskey, 1986; Little, 1993; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). Research conducted by Yoon and colleagues (2007) found upon examination of studies meeting the standards for examining effective PD on student

achievement, “that average control group students would have increased their achievement by 21 percentile points if their teacher had received substantial professional development” (p. 2). These results further confirm the effectiveness of quality PD to enhance teacher knowledge and skills, which improves classroom teaching, leading to improved student achievement (Yoon et al., 2007). Recognizing the importance of quality PD, the following section identifies effective PD elements utilized in the design of PD resources for this study.

Effective Professional Development

Darling-Hammond, Wei, Andree, Richardson, and Orphanos (2009, p. 9-11) identified four critical elements for effective PD. These elements detail PD that is: (1) intensive, ongoing, and connected to practice, (2) focused on student learning and address the teaching of specific curriculum content, (3) aligned with school improvement priorities and goals, and (4) conducive for building strong working relationships among teachers. Additionally, effective PD assists teachers in developing learning habits to increase their motivation for successful lifelong learning (Bean, 2015) and advances a teacher’s understanding of effective instructional strategies founded in research (Yoon et al., 2007). This development often is enhanced by improving teachers’ skills and competence as they work toward a common vision, student achievement (Bean, 2015). As these elements often vary by teacher, a shift from traditional PD methods to coaching methods may constitute a better approach.

According to Bean (2015), effective PD impacting change encompasses five characteristics. First, focused PD must align with school and district goals. When alignment occurs, the risk of attempting too many PD efforts reduces. Second, effective PD sustains over a longer term. Sustainability often begins with a workshop type learning experience and extends throughout the year with opportunities for practice, application, inquiry, and reflection. Third,

the PD process must include interwoven feedback. Teachers need a mechanism to acquire feedback from experts as they implement the changes outlined by PD. Fourth, with the continual increase in teacher responsibility, PD should not involve an additional piece added to an already full schedule. Strong PD embeds into the existing classroom practices through real examples (i.e., problem-based learning) and explanations given by colleagues and peers. Such examples help teachers determine relevance and increase competence through recognition of others' trials and successes. Lastly, effective PD acknowledges the work teachers do and recognizes them for their accomplishments. Such recognition creates empowerment and participation in the PD process.

Using both the critical elements identified by Darling-Hammond and colleagues (2009) and the characteristics identified by Bean (2015) I sought to create intensive, ongoing PD that connected to teachers' practice over long periods of time. Such PD needed to focus on student learning (with the teacher as the student), provide feedback throughout the coaching duration, and align with the goals of Learning Academy. Furthermore, I derived PD methods to assist in developing learning habits to increase motivation for life-long learning. Lastly, throughout the coaching process, I aimed to recognize teacher accomplishments.

Traditional Professional Development

Many educators and researchers demonstrate the ineffectiveness of traditional PD delivery methods for both student and teacher growth and achievement (Alaniz & Wilson, 2015; Ball & Cohen, 1999; Knight, 2006). Such PD models tend to follow a one-size-fits-all approach (Alaniz & Wilson, 2015; Bean, 2015). This approach centers on a single, isolated, PD session with little to no support or follow up. Furthermore, traditional PD often lacks coherent infrastructure (Wilson & Berne, 1999), based on transmission of information often irrelevant to

what individual teachers need (Bean, 2015). Under this type of PD model, school leaders expect teachers to attend a workshop and then change their teaching practices based upon the knowledge they obtained. Such practice does not result in enhanced student achievement. In a study conducted by the National Staff Development Council (2009), when questioning teachers about their PD experiences, teachers report feeling unsatisfied with their PD. With feelings of dissatisfaction associated with PD, expecting change based upon PD is unrealistic.

Realizing the limitations of traditional PD methods, I did not want to inhibit the PD for this study within the confines of traditional PD. As such, I sought a PD method allowing for greater flexibility and individualized instruction. Namely, a PD method teachers found satisfying, that considers their identity throughout the PD process.

Coaching Methods

Teachers, as adult learners (i.e., Andragogy; Knowles, 1978) bring background and expertise to their learning (i.e., learning identity) (Alaniz & Wilson, 2015). As a PD model, coaching acknowledges and internalizes the significant impact teachers' needs, responsibilities, personal knowledge (Alaniz & Wilson, 2015), identity, and background contributes to their learning needs. Such acknowledgement creates a more individualized approach to learning. Each teacher brings unique factors to their teaching and learning, and those factors cannot be ignored as variables in the learning process. Additionally, coaching reflects the five characteristics of effective PD outlined by Bean (2015).

Different from traditional PD, coaching takes a professional learning stance, making learning a lifelong process, not an isolated event. Professional learning engages educators through reflection of their teaching practices (Alaniz & Wilson, 2015). Grounded in Dewey's (1933) interpretation of reflective reasoning, reflecting on learning takes action possibly

perceived as routine, limited, or automatic and creates intentional deep learning occurrences (Alaniz & Wilson, 2015). Dewey (1933) classified genuine reflection as action which transforms human behaviors from impulsive to rational. Reflection includes recognition of success, failure, improvement, connection, extension, value, and linked causal factors (Alaniz & Wilson, 2015).

The current student generation appears more likely to want to understand why they receive specific instruction types and activity in class (Pacansky-Brock, 2017). If teachers have not reflected on their DL use, highlighting their beliefs and attitude surrounding DL, how will they explain impact for student use? Furthermore, what will be the impetus for change in DL integration?

In summary, traditional PD methods often prove ineffective. A coaching model of PD more effectively considers teachers' background and experience, providing choice in numerous PD aspects (e.g., application, implementation, response, content). Furthermore, coaching approaches learning from an adult education perspective (e.g., recognizes teachers as internally motivated and self-directed, brings life experiences and knowledge to learning experiences, and creates practical application for resources). These principals provided the foundation for study development and implementation. Therefore, I chose a coaching model as the implementation method for this study since the participants contained varied backgrounds, bringing their own experiences and identity to their teaching and learning. Individualized coaching methods properly support these characteristics. Approaching PD from a more traditional "one size fits all" model would ignore differences and valuable information necessary to implement change and better recognize the participants' needs.

Adult Education Influences on Professional Development

Quality adult education goals include empowering adults as self-directed and self-managing learners as they appear "self-directed in other areas of their lives and therefore should be given opportunities for self-direction in their learning" (Guglielmino, 1993, p. 231). Adult learners appreciate choice in their learning, with the learning process directly related to their needs (Cave, LaMaster, & White, 2006). Traditional PD often lacks choice and application. Typically, in traditional PD models, facilitators predetermine included content and required action items related to the delivered PD (Guglielmino, 1993). This approach often fails to result in substantive or sustained change (Cohen and Hill, 2000; Elliott, 2017; Parsad, Lewis, & Farris, 2001; Porter, Garet, Desimone, Yoon, & Birman, 2000). Furthermore, as teachers work to manage daily job requirements, they forget traditional PD lessons as most PD is disconnected from classroom application and do not create opportunities for immediate integration (Alaniz & Wilson, 2015). Teachers deserve treatment as professionals, giving them choice and responsibility for creating their own customized and contextualized development plan.

While not all adult learners demonstrate adequate skills to independently take ownership of their learning (Guglielmino, 1993), measures such as coaching and goal setting can assist in the ownership of learning and empowerment toward learning decisions. When given opportunities to make their own learning choices, teachers likelihood to increase learning effort and enthusiasm enhances (Guglielmino, 1993). Additionally, Strudler and Hearrington (2009) report an increase in likelihood for technology integration when educators have access to coaching. Thus, coaching through an adult education lens proved vital for PD creation and implementation for this study. As capable, intelligent professionals, teachers deserve a PD method highlighting their competence.

Teacher Age as Related to Technology Use

While some teachers comfortably use technology for purposes outside the classroom (out-of-school literacies), when it comes to using DL skills to learn, they learn as they go, if at all. Teachers often appear deficient in DL based instructional techniques and student learning transfer (Smith, 2007). The current teacher population in the United States varies in DL experience and exposure. With 44% of teachers under age 40 (see Table 3.2) (McFarland, Hussar, de Brey, Snyder, Wang, Wilkinson-Flicker, ..., & Bullock Mann, 2017), it is possible teachers, like their students, have not been taught how to incorporate DL techniques for their own learning (Schneider, 2015). Furthermore, these teachers likely do not know how to teach DL techniques to others (Kalman & Guerrero, 2013). While age does not always play a factor in DL integration, age, combined with experience and background, should be considered when developing a PD based coaching model due to differences in levels of DL instruction in teacher education.

Table 3.2

Teacher Demographics—Age

Teacher Age	Percentage
<30	15.3%
30-39	28.9%
40-49	25.1%
50-59	23.1%
>60	7.6%

Gender's Influence on Technology Integration

Gender impacts technology integration and DL coaching factors. Women and men tend to learn, apply, and integrate technology differently (Li, 2015). Specifically, men learn

technology before applying that learning to their teaching. Women primarily focus on their teaching, incorporating technology after strengthening pedagogy (Campbell & Varnhagen, 2002). Furthermore, a man's main source of technology knowledge comes from their own experiences while women tend to learn technology from others (Zhou & Xu, 2007). Joiner et al. (2011) explains we often view technology as a male domain which influences DL confidence and identity development. Additionally, knowing gender differences remain a factor in PD preferences and need (Li, 2015) as men and women learn differently, I designed and implemented PD resources for this study using gender differences as one factor in determining best coaching practices for each participant.

Teacher Change Process

Recognizing differences in teaching and learning modalities guide teachers' identity (i.e., age, gender, background, experience), I needed to account for these differences when creating individualized coaching resources for each participant. As the impetus for DLI growth based in change, resource development needed to include developmental aspects potentially leading to change as guided by the teacher change process.

Guskey (2002; 1986) constructed a model illustrating the teacher change process (Figure 10). According to Guskey (1986), change in student learning outcomes causes the greatest change in teachers' beliefs and attitudes with the most influential factor related to teacher change shaped by their classroom experiences. Teachers' background and experience guide such classroom experiences (Guskey, 1986).

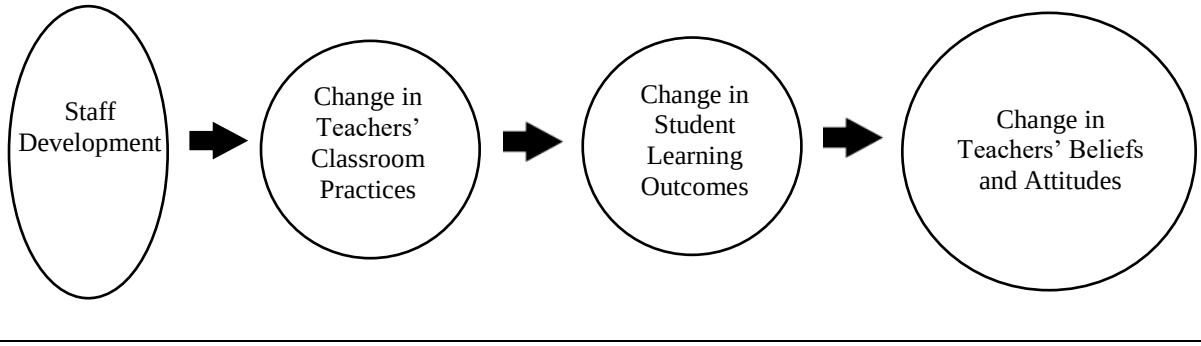

Figure 10. A Model of the Process for Teacher Change (reprinted from Guskey, 1986)

With many characteristics influential in developing a DLI, an individualized approach to PD potentially will have the largest impact on increasing a teacher's DLI and creating a lifelong learning habit. Such an individualized approach occurs through a coaching framework toward PD. For this study, I used a coaching model to examine teachers' experiences recognizing and developing their DLI, as well as better recognizing the impact of coaching as a PD method.

Methodology

Professional development, in any form, is a pragmatic endeavor aimed at improving teachers' education and practice. The complex nature of teaching and learning, from a teacher perspective, requires a recognition qualitative and quantitative data alone cannot fully encompass. By using only one methodological approach, shortcomings can exist. These shortcomings cause researchers to more frequently turn to a mixed methods design. Mixed methods research harnesses the perspectives of both qualitative and quantitative data. Such an approach is potentially stronger and more effective than relying on a single method alone.

This study takes a mixed methods approach for three reasons. First, the PD's practical nature lends itself to the pragmatic nature of mixed method design. Both focus on effective elements of collecting information and determining best decisions. Second, teacher learning for

personal reasons is complex and often intertwined with professional learning. Mixed methods research allows for a deeper exploration and recognition of the complex and intertwined teacher learning process. Third, collecting and analyzing multiple data types remains necessary and important to the full story contained within a PD based coaching model. I include research questions and analysis for this study in Table 3.3.

Table 3.3

Study II Research Questions and Analysis

Study Presumption	Research Questions	Hypothesis	Data Sources (* previously collected)	Analysis
Coaching based professional development specifically focused on increasing teachers' digital learning identity will increase both quantity of digital literacy integration and quality from a method of consumption to production.	1. In what ways and to what extent does coaching based professional development, focused on teachers' personal use of digital literacy, affect teachers' digital learning identity as measured by self-report, survey data, and artifact analysis?	Coaching based professional development focused on teachers' personal use of digital literacy increases teacher' digital learning identity by increasing teachers' confidence, application, value, and experiences with digital literacy.	-*DLIS* Survey Version 3 administered to Learning Academy teachers in January 2018 -*DLIS* Survey Version 3 administered to Learning Academy teachers in August 2018 -Focus Group conducted in August 2018 -Weekly Check-in Forms -Professional Development Reflections -Goal Setting Sheets collected in January 2017	-Wilcoxon Signed Rank Comparison (pre-post) -Qualitative coding guided by Glaser and Strauss's (1967) Grounded Theory -First cycle coding (round 1) – open coding -First cycle coding (round 2) – a priori coding -Second cycle coding – axial coding -Thematic Analysis overlaid with artifact timeline
	2. What aspects of coaching based professional		-Focus Group conducted in August 2018 -Weekly Check-in Forms	-Qualitative coding (same as above) -Thematic Analysis overlaid

Table 3.3 Continued

Study Presumption	Research Questions	Hypothesis	Data Sources (* previously collected)	Analysis
	development were reported as most influential by teachers as measured by self-report? 3. Do changes in teachers' digital learning identity transfer to changes in how they integrate digital literacy within their classrooms as measured by self-report and artifact analysis?		-Professional Development Reflections -*DLIS* Survey Version 3 administered to Learning Academy teachers in January 2018 -*DLIS* Survey Version 3 administered to Learning Academy teachers in August 2018 -Weekly Check-in Forms -Professional Development Reflections -Goal Setting Sheets collected in January 2017	with artifact timeline -Qualitative Coding (same as above) -Digital Learning Integration Matrix

Study Recruitment

After receiving approval from the Institutional Review Board (IRB), the data collection process began. Participant recruitment, at Learning Academy (See Chapter 1), began in November 2017. Recruitment efforts included presenting proposed research to all Learning Academy faculty and answering any questions they had regarding the process.

At the initial faculty meeting, I communicated my goal as a teacher willing to help, a necessary piece in establishing a coaching relationship (Knight, 2007). I followed up the initial meeting with an email to the faculty summarizing and reviewing the study specifics, projected

start date, and the IRB approved information sheet. Starting in January 2018, I sent all Learning Academy faculty a second email with research guidelines, a copy of the information sheet, and a link to the *Digital Learning Identity Survey (DLIS)*. Participants then consented for inclusion in the study and began the study procedures.

Study Procedures

After completing recruitment efforts, the original sample for this study included 15 in-service teachers employed at Learning Academy. Notably, I served as an administrator at Learning Academy a few years prior to this research. This private school serves K-12 students and the study participants equally represent the teacher population; seven teach at the K-5 grade range, three teach at the 6-8 grade range, and five teach at the 9-12 grade range. Three weeks after the study began, three participants asked me to remove them from the study and an additional participant completed zero study components, leaving the final participant sample at 11 (see Table 3.4). Two withdrawn participants taught at the K-5 grade range and the remaining two taught at the 9-12 grade range. I invited all four withdrawn participants to share why they left the study. One shared a family emergency had caused strain on her time requiring her to focus all her spare time on her teaching. A second participant shared she withdrew due to not seeing a need for DL integration as an orchestra teacher. I sent her resources on how to integrate DL into music classes but she still chose to withdraw. The remaining two participants did not explain their withdrawal.

Table 3.4

Final Participant Demographics

Pseudonym	Gender	Age	Race	# of Years Teaching	Current Teaching Assignment
Jessica	Female	27	Caucasian	6	1st grade (self-contained)
Katherine	Female	43	Caucasian	22	3rd grade ELA
Camille	Female	33	Caucasian	12	4th grade ELA
Nancy	Female	41	Brazilian/ American	18	5th grade Humanities
Jane	Female	42	Caucasian	19	5th grade Science and Math
Elise	Female	25	Caucasian	4	K-5 Spanish
Patrick	Male	59	Caucasian	38	Middle School ELA
Erin	Female	28	Caucasian	7	Middle and Upper School ELA
Grant	Male	46	Caucasian	25	Upper School Science
Geoffrey	Male	65	Caucasian	44	Middle and Upper School Math
Jill	Female	32	Caucasian	11	Middle and Upper School Spanish

Initial Data Collection: Establish the Need

Using Alaniz and Wilson's (2015) Collegial Coaching Model for Technology Integration (Figure 8), all participants began the process to determine their current DLI by completing the *DLIS* (Version 3) in January 2018. In addition to the validated survey items, the survey also includes questions related to technology use to better recognize each participants' DL need (see Table 3.5). Demographic information revealed teachers had varying levels of DL experiences prior to the start of this study. As the participants had not begun the study when they completed the survey, I used the term technology instead of DL as confusion often surrounds the meaning of DL.

Table 3.5

Additional Survey Questions

	Jessica	Katherine	Camille	Nancy	Jane	Elise	Patrick	Erin	Grant	Geoffrey	Jill
On average, how many hours do you spend each day using technology for personal reasons?	2-3	>5	4-5	4-5	1	2-3	2-3	2-3	2-3	1	2-3
On average, how many hours do you spend each day using technology for professional reasons?	4-5	2-3	2-3	>5	2-3	4-5	>5	>5	2-3	2-3	1
What technology do you use most frequently?	Cell phone, iPad, laptop	Compute r -search engine	Computer – online searches	Google Apps, YouTube, TedTalks, Author Sites, Facebook, Facetime, History Alive	Smartpho ne and computer	Laptop, computer , iPad	Smartph one, laptop, computer	Google docs, Gmail	Laptop and cell phone	iPad, computer , iPhone	Search engines
At what age did you start using technology to assist with your learning?	20	17	17	25	18	14	14	18	18	50	20

Table 3.5 Continued

	Jessica	Katherine	Camille	Nancy	Jane	Elise	Patrick	Erin	Grant	Geoffrey	Jill
When did you start using technology in your classroom?	4-5 years ago	8-10 years ago	6-7 years ago	More than 10 years ago	More than 10 years ago	2-3 years ago	More than 10 years ago	8-10 years ago	More than 10 years ago	More than 10 years ago	Just this year
Where did you learn how to use technology for teaching purposes?	Self-taught	Professional development	Pinterest and Teachers Pay Teachers, some while getting master's degree	As a teacher in schools	Self-taught	University coursework	Professional development	Self-taught	Self-taught	Professional development	School help
Where did you learn how to use technology for your own personal learning?	Self-taught	Professional development	Self-taught	Professional development	Self-taught	Self-taught	Professional development	Self-taught	Self-taught	Self-taught	Self-taught
What form(s) of technology do you own?	Smartphone, tablet, laptop	Smartphone, tablet, computer, laptop	Smartphone, tablet, laptop	Smartphone, tablet, computer, laptop	Smartphone, tablet, laptop	Smartphone, tablet, laptop	Smartphone, laptop	Smartphone, computer, laptop	Smartphone, tablet, computer, laptop	Smartphone, computer, laptop, iPad	Laptop, Mp3 player

After survey completion, participants set goals for their learning, based upon their survey results (Appendix G). Goal setting proves vital for determining participant need as adults learn best in situations with provided opportunities to establish goals for learning (Alaniz & Wilson, 2015). Furthermore, adults tend to prefer to work toward self-selected, relevant goals (Alaniz & Wilson, 2015). To enhance the experience and clarity of setting goals, I sent the participants information detailing how to set their own learning goals as well as a video walking them through the goal setting process (see Appendix J).

Digital Learning Identity Survey

The Digital Learning Identity Survey (*DLIS*) is an instrument designed to help teachers recognize their own DLI. The survey consists of 60 items and was designed to be administered at both the beginning and end of a period of time to determine change in DLI. The *DLIS* is a six-factor instrument, measuring DL constructs of *Attitude, Self-Regulated Learning, Knowledge Sources, Knowledge Achievement, Challenge, and Self-Efficacy*. The DLIS measures these DL constructs on a 5-point Likert scale. As a valid measure of DLI, the Cronbach's α reliability estimation for the *DLIS* is 0.881. Furthermore, factors related to DL and self-regulated learning components (Greene et al., 2014) adequately measure the desired *DLIS* components, proving measure validity. See Chapter 2 for details.

Communication and Data Collection: Create Partnerships

After the initial baseline data collection (i.e., *DLIS* results), participants checked in weekly by completing one of the three reflection forms created for this study (see Appendix L - N). I developed these reflection forms to assist in recognizing and tracking participants' progress. Based in Dewey's (1933) work, reflection creates opportunities for action to become

intentional. Teachers complete hundreds of actions daily they often do not even consider. For true recognition of learning through DL to occur, I needed to create opportunities for participants to intentionally reflect on their learning processes.

These check-ins served two purposes. First, they created partnerships between myself and my participants. These partnerships helped both parties learn more about each other and enhance the coaching relationship. While less than half of the study participants knew me as an administrator, I remain familiar with the school culture, which creates an enhanced partnership. This partnership is not quickly or easily established so the existing relationship increased respect for me as a coach (Alaniz & Wilson, 2015). Second, the check-ins helped me determine needed professional learning resources to help each participant achieve their established goals.

Professional Learning Resources: Target Differentiated Projects

The participant check in's combined with initial baseline and goal setting data guided the weekly professional learning resources sent out electronically to participants. All participants received weekly emails containing professional learning resource options, but email content differed based upon individualized needs as determined above. All professional learning resources combined with additional email correspondence, composed the coaching-based PD. I developed these resources and the PD structure for this study guided by the ISTE (2017) standards for educators as well as Bean's (2015) and Darling-Hammond and colleagues (2009) guidelines for effective PD. I include possible professional learning resource examples in Table 3.6. As a source of triangulation, I documented all coaching procedures. This tracking included materials and resources sent to each participant, communication with participants, and decisions made regarding participant check-ins, goal setting, and artifacts (Appendix I).

Online PD proves appropriate for this study as it provides modeling for DL integration. Additional, no significant difference exists between PD delivered online or face-to-face (Fishman, Konstantopoulos, Kubitskey, Vath, Park, Johnson, & Edelson, 2013) with benefit seen for using technology to deliver the PD as technology can provide greater opportunity for "differentiated, teacher-centered, self-directed models of teacher learning" (Bean, 2015, p. 127). I established no set curriculum for the personal learning resources as I based my coaching on individual participant need. I did create a draft intervention schedule to assist with organizing the coaching process (Appendix H).

Coaching Methods

Alaniz & Wilson (2015) note "effective coaches work shoulder-to-shoulder with coached teachers, practicing new skills and activities side by side, rather than presenting a demonstration and expecting instant duplication" (p. 84). Even with content provided electronically, this implementation remained relevant for the coaching model established in this research. I participated in each professional learning opportunity, guided by my own set goals, and shared my learning results each week with participants. I also created videos to walk the participants through various learning aspects (see Appendix J).

Weekly emails followed two formats. The first included a professional learning opportunity structured around an activity, a video, and research (See Table 3.6). All three resources connected to one another, and participants could decide which learning method best suited them. Some participants chose to engage in multiple options during the week. The second format included an option to catch up on resources from previous weeks or a concept for reflection (Appendix K). I created emails in this manner to first recognize the individual learning styles and needs of the adult learners in this study. Adult learners bring various experiences,

skills, and knowledge to their learning process influencing how they learn (Bean, 2015). Also, by using various approaches and activities for resource delivery, I individualize the learning process further (Bean, 2105), allowing participants to reflect differently based upon the activity.

Table 3.6

Possible Professional Development Examples

Participant Chosen Area of Desired Growth	Type of Professional Development	Resource Content
Attitude	Activity	Teachers complete an activity to help them reflect on the importance of technology in their own lives.
	Video	Digital Literacy and Why It Matter Video
	Research	"Technology is a Tool, not a Learning Outcome" article
Knowledge Achievement	Activity	Teachers sign up for digital literacy-based Google community, reading shared information
	Video	Walk through using the SAMR model to evaluate a sample lesson
	Research	Article explaining the SAMR model and its usefulness
Knowledge Sources	Activity	Skype Analysis
	Video	Making Learning Personalized and Customized Video
	Research	Three Techniques for Increasing Digital Literacy article

Data collection concluded in August 2018, with participants completing a second round of the *DLIS* (Table 3.7), a focus group, and a final check-in, reflecting on the process. Jill left Learning Academy suddenly at the end of the year and I lost contact with her. As such, she never completed the *DLIS* post-survey, making the final participant count ten.

Table 3.7

DLIS Scores from January and August Administration (out of 50 possible points)

		Section A: Attitude	Section B: Self-Regulated Learning	Section C: Efficacy	Section D: Knowledge Achievement	Section E: Challenge	Section F: Knowledge Sources
Patrick	Pre	49	40	41	42	37	34
	Post	50	50	47	50	50	50
Camille	Pre	41	40	38	43	41	28
	Post	50	47	50	47	48	45
Erin	Pre	50	50	47	46	50	49
	Post	50	50	50	46	50	49
Nancy	Pre	36	32	34	32	35	21
	Post	39	35	35	32	35	25
Jane	Pre	41	39	39	36	36	28
	Post	42	39	41	39	37	34
Geoffrey	Pre	23	26	35	29	21	11
	Post	20	23	23	20	21	13
Jessica	Pre	45	40	47	40	44	37
	Post	46	50	44	50	48	44
Elise	Pre	49	47	48	48	42	28
	Post	48	45	43	43	41	40
Grant	Pre	45	40	47	40	44	37
	Post	50	49	50	47	50	42
Katherine	Pre	44	43	39	48	42	36
	Post	50	46	41	43	46	39
Jill	Pre	41	42	42	38	43	49
	Post	-	-	-	-	-	-

Focus Group Format

I sent all participants a request for focus group participation, with twelve different date/time options, in August 2018. Of the 11 participants, six attended the focus group held in a classroom at Learning Academy. Following Krueger's (2009) focus group guidelines for questioning techniques and structures, the focus group lasted 60 minutes and followed predetermined questions (Appendix O). Focus group audio recordings were transcribed and analyzed in the same manner as all other qualitative data.

While combining focus group and survey data in a mixed methods format can be complex as the two data types produced differ, I felt it was appropriate for this study to tell the full story. To minimize the complexity, I followed Morgan's (1993) conceptual framework for clarifying mixed methods data, specifically survey and focus group data.

Morgan's (1993) framework describes using surveys as the primary data method and focus groups as the secondary. As my intent for this study included the focus group data supplementing the survey data, I approached the focus group as a secondary data collection method. This data helped provide information on how the participants "talk about the topics of the survey" (Morgan, 1993, p. 134). Talking about the survey not only adds to the study validation for further revisions but also assists in better realization of participants' thoughts while taking the survey. Such realization leads to a stronger recognition of how the *DLIS* can inform a DL aimed coaching PD model.

Additionally, I conducted the focus group as a follow up to help interpret the survey results. This method provides "illustrative material that can be quoted in conjunction with quantitative findings" (Morgan, 1993, p. 135). This process strengthens the study data, hoping the focus group data will produce results not possibly obtained using quantitative methods.

Instrumentation Development and Interviews: Assess the Progress

Matrix Development

To quantitatively assess the artifacts, I developed the Digital Learning Integration Matrix (Appendix T) based on the Common Core Standards (Common Core State Standards Initiative, 2010), Texas State Standards (TEA, 2017), the National Technology Plan (U.S. Department of Education, 2017) and TPACK framework (Mishra & Koehler, 2006). Starting with the revised version of Bloom's Taxonomy (Anderson, et al., 2001) as the basis for the matrix, I analyzed

state and national standards to aid in creation of a matrix designed to assess artifacts for digital learning integration.

For matrix creation, I consulted the Common Core Standards to inform elements necessary for evaluating DL integration, mirroring the skills students need as successful learners. Consultation of the TEKS integrated elements relevant to literacy content. The National Education Technology Plan informed learning elements beyond classroom integration, highlighting skills fostering constant learning. Lastly, the TPACK framework ensured evaluation focused on using technology to learn, not as a tool.

Data Analysis: Reflect on the Integration

Trustworthiness

To provide data from multiple perspectives, I intentionally included data collected through goal setting sheets, check-in forms, and reflections to increase study validity. Done in two distinct ways, data triangulation occurred by introducing multiple sources, and triangulation within methods as the various sources are distinctly different. The data obtained included both teachers' personal and classroom domains, gaining perspective as learners and teachers. Increase in confidence occurred as multiple data points led to similar themes through analysis.

Based on Lincoln and Guba's (1985) criteria to ensure trustworthiness of qualitative research — dependability, credibility, transferability, and confirmability — I used the following four strategies:

(1) Prolonged engagement - spending sufficient time in the research setting. With no predetermined standards to determine adequate time spent in the study (Merriam, 2009), I chose an amount of time encompassing both spring and summer experiences. This time frame allowed my participants time to incorporate the study aspects into their classroom (spring) and time to

reflect on their learning and growth in a less structured and demanding time (summer). In this study, I engaged in data collection for eight months (January-August 2018). This prolonged engagement enhanced the research findings' credibility, analogous to internal validity (Erlandson, Harris, Skipper, & Allen, 1993; Lincoln & Guba, 1985).

(2) Reflexive journal - a record of reflections on happenings in the study in the form of a personal log (Lincoln & Guba, 1985). I kept a journal to track my decisions, questions, and reflections throughout the research process. Additionally, journal entries encouraged reflection on my biases, assumptions, and experiences related to the study.

(3) Peer debriefing - discussing difficult questions arising during the research process with a professional not involved in the study (Lincoln & Guba, 1985). I used peer debriefing at different study stages, testing all artifacts with two peers before contacting my participants. Additionally, I asked feedback on emerging categories from two colleagues familiar with qualitative research and the study's context. I made changes to the categories and subcategories, based on feedback.

(4) Audit trail - a record documenting all conducted research. Guided by Lincoln and Guba (1985), my audit trail categories for reporting included: all data collected, data reduction and analysis, data reconstruction and synthesis, process notes, materials related to intentions, and instrument development information.

As a final attempt to increase trustworthiness in my study, I elaborated on my research role. In the next section, I discuss my position relative to this study.

Positionality

I, the researcher, do not enter into this study free of bias. My experience stems from identifying as a teacher for the past 16 years. Thirteen years at the K-12 level and three at the

higher education level with multiple years of K-12 experience as both a mentor and supervisor of novice and preservice teachers. Two years included an administrative role. At the higher education level, the majority of my teaching experience included preservice teachers in a teacher education program.

My experience teaching, mentoring, and supervising both in-service and pre-service teachers revealed many teachers appear ill prepared to incorporate DL into their classroom instruction. Ill preparedness is coupled with a large initiative to incorporate DL and minimal support and guidance in DL instruction. This disconnect between expectations and preparedness led to often lacking self-efficacy related to DL and reluctance to incorporate DL into their classroom. As explained to me by one senior methods student (senior level education course, focused on literacy instruction), "the students know more than I do". This comment, as well as my own experience transformed my research interest. My researched shifted to investigating how PD specifically geared toward increasing teachers DLI – how they use technology for higher purposes of learning – impacts a teacher's DL integration, through reflection, resources, guidance, and facilitation of learning.

The pre-service students I taught had similar difficulties related to DL instruction as the teachers I had interacted with for years as a technology trainer and administrator. To better recognize causes of lacking DL instruction, I piloted an informal study in fall 2017 with senior methods students majoring in literacy and social studies education. I learned participants, while often seen as digitally competent, felt inadequately equipped to incorporate DL into their future classrooms. As a result, they felt disheartened because people assumed they were DL experts. These senior methods students reported they had received little instruction in teaching using DL due to assumptions that they had grown up with technology and would automatically know how

to integrate DL into instruction. This realization has shifted the way I approach teacher education and PD, leading to the conception and data collection methods of this study.

Analysis Procedures

Upon organization of the collected data, I began the data analysis using the procedures outlined in Chapter I. To determine change in participants' DLI, I created an artifact timeline using data from the weekly check-ins, professional learning resources, and any other additional coaching correspondence. I organized all artifacts in chronological order and analyzed for patterns or changes. I answered the study's research questions using the following analysis methods.

To determine in what ways and to what extent PD, focused on teachers' personal DL use, affect teachers' DLI as measured by self-report, survey data, and artifact analysis, I conducted multiple analyses. First, using pre-and post-survey data, a Wilcoxon Signed Rank Test assessed teachers' digital learning identity growth. Due to the sample size, a Wilcoxon Signed Rank Text proved most appropriate as it does not assume normally distributed scores. Additionally, a Wilcoxon Signed Rank Test is based on difference in scores, but also considers the magnitude of the observed differences (Raykov & Marcoulides, 2011). Next, I evaluated artifacts for changes in DLI and DL integration. Lastly, I conducted two coding rounds for thematic analysis using all collected artifacts (see Table 3.2). Upon determination of themes, analysis included an interpretation of the identified themes, linking interpretation to study questions. Coding procedures presented themes related to the categories created for the *DLIS* (e.g., *Efficacy, Knowledge Achievement, Knowledge Sources, Self-Regulated Learning, Challenge,* and *Attitude*). I aligned all collected artifacts and study interventions sequentially to gather a holistic look at each participant's journey through the study. Using collected artifacts in an artifact

timeline helped align shifts in artifacts with conducted interventions to determine change patterns based upon PD implementation.

To determine what PD aspects participants reported as most influential, as measured by self-report, I conducted two coding rounds for thematic analysis using artifact, focus group, and check-in data. According to Merton and Kendall (1946), focus groups are appropriate when a researcher tries to understand the relationship between a stimulus (PD) and an effect (change in identity). During the focus group, I asked participants questions related to the PD experience and classroom impact (see Appendix O). Qualitative analysis helped further determine PD's effect on DLI and create external validation necessary for measurement creation.

To determine if changes in teachers' DLI transfers to changes in how they integrate DL within their classrooms as measured by artifact analysis, I used the Digital Learning Integration Matrix to evaluate artifacts for change. Changes in survey data (as measured by Wilcoxon Signed Rank Test) aligned to changes in DL quantity and quality.

Results and Discussion

This study examines teachers' experiences recognizing and developing their DLI. Additionally, the research gives insight into the impact of coaching as a PD method. While opportunities for teachers to receive PD in DL integration become more prevalent each year, teachers often lack awareness of their own digital learning or how their digital learning transfers to classroom integration (Alaniz & Wilson, 2015). When teachers increase their DLI awareness, they potentially see value in the process of becoming lifelong learners. Such an increase connects teachers' learning to their students' learning, allowing for adaptation of DL integration to fit their students' needs.

This study's objectives included testing the efficacy of a coaching model of PD for increasing teachers' personal DL. Furthermore, to measure the extent increasing teachers' DLI will increase DL integration into classroom instruction. I achieved these objectives through analysis of pre-post survey results and artifacts collected from my 11 teacher participants as they engaged in an eight-month PD based coaching model. The model aimed at enhancing teachers' recognition of how they use technology for higher learning purposes (i.e., their DLI). The teachers' themes of personal versus professional DL learning, teaching application connected to student learning, and DL support highlighted through artifact analysis expose areas of consideration for DL based PD. The following discussion brings light to the implications of these themes, in response to the research questions posed in this study, as areas to consider when developing DL based PD.

Effect of Professional Development on Teachers' Digital Learning Identity

In response to research question #1, In what ways and to what extent does PD, focused on teachers' personal DL use, affect teachers' DLI as measured by self-report, survey data, and artifact analysis, I used thematic analysis on artifacts and focus group data (organized in a timeline), and Wilcoxon Signed Rank Test results to interpret the themes presented by the data. I hypothesized PD focused on teachers' personal DL use increases teacher' DLI by increasing teachers' confidence, application, value, and experiences with DL.

Notably, not all teachers participated equally in the provided PD. To reduce the demand on participants' time, I provided options to reflect on the sent professional learning resources either by email, or through weekly check-ins. Even with this choice, participation varied (see Table 3.8). As noted by Alaniz & Wilson (2015), participants must demonstrate a willingness to

learn or a teachable spirit to achieve desired coaching results. Both factors, willingness to learn and teachable spirit, potentially explain some of the lacking participation in the current study.

Table 3.8

Teacher Participation in Coaching (self-report)

Participant	Participation
Jessica	25-49%
Katherine	75-89%
Camille	90-100%
Nancy	90-100%
Jane	25-49%
Elise	50-74%
Patrick	75-89%
Erin	90-100%
Grant	25-49%
Geoffrey	50-74%

All study teachers (N=11) commented at least once on the effectiveness of this study's coaching model. Though they used different words to emphasize effectiveness, all agreed on some level of impact a coaching model of PD focused on DL provides. For example, Jane stated, "I think my biggest challenge is being able to figure out how to incorporate technology into the math classroom. But at least I am thinking about it now thanks to this study!" (C3_021618). Furthermore, Erin shared, "Nearpod looks super interesting…Thanks for sharing! I would love to set up future goal setting meetings with you because selfishly, it would totally benefit me" (C14_08082018). As this study's purpose is to determine the impact of coaching-based PD on teachers' DLI, it is important to analyze artifacts for information leading to recognition of effective and ineffective coaching aspects. Additionally, analysis should be conducted to identify areas potentially influenced or needing addressed through PD.

Digital Learning Identity Growth

Given the small final sample size (n=10), I computed a Wilcoxon Signed Rank Test for each survey item to examine pre-posttest differences in perceived DLI. An average score close to five indicates the responses tended to agree/strongly agree with the statement. Similarly, an average close to one indicates a tendency of disagreement with the statement. Appendix P summarizes this analysis by survey item.

A significant difference existed between scores on one item in the *Attitude* factor — "I like to use technology for many different things" ($Z = 2.00, p < .05$) indicating the teachers' attitudes shifted positively from beginning to end of the PD. The study's emphasis on increased participants DL experiences possibly explains these results. An increase in DL experiences, leads to possible enhancement of DL attitude as experience potentially impacts attitude toward and knowledge associated with DL use (Jolls, 2015; Wigfield & Eccles, 2000).

Similarly, participants showed a statistically significant difference towards two items in the *Self-Regulated Learning* factor — "I use technology with a purpose" ($Z = 2.121, p < .05$) and "I use many different types of technology" ($Z = 2.333, p < .05$). Personal learning resources focused on integrating time for study participants to reflect on their learning. A piece of this reflection included the purpose behind DL use, which may influence participants views on their type of DL use.

After involvement in the coaching procedures, statistically significant differences were also found regarding two items in the *Challenge* factor — "I use technology to learn things that make me think" ($Z = 2.00, p < .05$) and "I use technology to learn rich material" ($Z = 2.00, p < .05$). Participants reflected on aspects of the study that challenged their thinking. For example, Katherine noted:

> So, going through this process, I view digital literacy differently. When we first started, I was thinking of it as just technology reading or working in the classroom. After [the resources in this study] I realized that it encompasses so much more. I didn't think that I used it very often; however, I do…I also feel more comfortable with approaching it with my students. (R6_041018).

Statistically significant items related to *Challenge* may reveal not only that teachers increased the depth of DL knowledge, but also their awareness of their DL knowledge due to study procedures.

Moreover, participants showed a significant difference regarding three items in the *Knowledge Sources* factor — "Technology often makes me want to make personal changes in my life" ($Z = 2.456$, $p < .05$), "Technology makes me carefully consider changes I should make in my life" ($Z = 2.232$, $p < .05$), and "Some of my character is shaped by what I learn using technology" ($Z = 2.428$, $p < .05$). The *Knowledge Sources* factor showed the greatest overall increase in scores. As many participants set goals focused on increasing their sources of DL knowledge, the personal learning resources I sent in this study were aimed at DL resources to use for learning. A focus specifically on increasing knowledge sources may have led to the statistically significant results regarding knowledge source items. Overall, the participants (81.82%) stated they found the coaching model of PD beneficial to their growth.

While I focused my PD resources on teachers' set goals, the delivered PD's overarching theme included recognizing personal DL use through a hybrid project-based learning approach (Alaniz & Wilson, 2015). The items above all focus on using DL to learn. Results indicate coaching based PD assisted the participants in this study in better recognizing how they use DL to learn personally.

In addition to running analysis by item, I ran a Wilcoxon Signed Rank Test by survey factor based on calculated survey results (out of 50 points). An average score closer to 50

indicates responses tended to agree/strongly agree with the statements in the factor. An average closer to zero indicates a tendency to disagree with the statement (See Table 3.9).

Table 3.9

Item Score Averages with Differences and Associated p Values

Survey Factor	Pre Average	Post Average	D	Z	P
Attitude	42.70	44.50	1.80	1.253	0.210
Self-Regulated Learning	40.30	43.40	3.10	1.970	*0.049**
Efficacy	41.50	42.40	0.90	0.614	0.539
Knowledge Achievement	41.20	41.70	0.50	0.140	0.889
Challenge	39.60	42.60	3.00	1.892	*0.050**
Knowledge Sources	32.10	37.80	5.70	2.016	*0.044**
Note. * Indicates significance at the .05 level.					

Wilcoxon results demonstrated *Knowledge Sources* showed the greatest increase in scores across all participants (*Z = 2.016*) and *Knowledge Achievement* showed the least increase in scores (*Z = 0.142*). Applied to the provided PD, these results seem indicative of the PD resources I provided. Eight study participants created goals geared toward *Knowledge Source* growth (e.g., Increase the amount and type of technology I use for higher purposes of learning by 10+ points.) while only three participants' goals reflected the area of *Knowledge Achievement (*e.g., Increase my DL knowledge by one to two points.*).* I did not attempt to increase all DLI areas, so it is logical that participants did not demonstrate growth in all DLI areas.

This coaching-based PD model focused on teachers' goals and self-determined areas for growth. As such, based upon *DLIS* results, teachers set goals for growth focused *on Self-Regulated Learning* (13%), *Efficacy* (14%), *Knowledge Achievement* (14%), *Challenge* (23%), and *Knowledge Sources* (36%). No participant set goals for *Attitude*. Coaching practices and resources focused on the goals set by each participant.

Upon pre and post-survey results analysis, all participants demonstrated growth in at least one subcategory with 70% of participants demonstrating growth in two or more subcategories (Table 3.7). Two participants (Geoffrey and Elise) showed a decrease in scores in at least one subcategory over the course of the study. Both participants experienced situations external to this study affecting their growth. Geoffrey perceives strong pushback from administration regarding his DL use and feels, "[he is] too old to learn something new and change [his] teaching style so if administration thinks someone can do a better job than [he] can then [he] will just retire" (Geoffrey_030418). Elise had a tragic life situation occur in the middle of the study that greatly disrupted her routine and perceived confidence.

Educators often see themselves in well-defined roles (Stet & Burke, 2000) and rarely allow themselves the opportunity to reflect on their identity as a teacher and learner, making assumptions about their roles and abilities (i.e., Expectancy Value Theory; Wigfield & Eccles, 2000). As explained by Stryker and Serpe (1982), the stronger a commitment related to an identity, the greater salience of and effort placed toward that identity. Most participants in this study (N=10), through survey and artifact data, demonstrated growth in their DLI. This growth potentially led to more effort placed toward further developing their DLI and explains resulting change.

To further interpret resulting change, in addition to the above quantitative analysis, qualitative analysis further interpreted results based upon research question #1. In the following sections, I present these results, by theme. Given the self-report nature of the data sources, I verified category strength by noting the response percentage in each category (see Chapter 1/Table 1.4). To maintain reliability, I created an evidence chain to record coding decisions and changes (McAllister & Irvine, 2002) along with keeping a journal of methodological decisions and processes made throughout analysis (Huberman & Miles, 1994).

Personal versus Professional Learning

One goal of this dissertation was for teachers to recognize DL use for personal learning. As such, I focused all resources toward learning for personal purposes, not professional. Early into the study, I realized my teachers experienced difficulty separating their personal learning from their professional learning. For many participants, all perceived learning involved professional reasons and motivations, with little time to focus on learning any content not school focused. From a meta cognitive perspective, it remains important for teachers to reflect on their own learning processes whether as a specific content area (e.g., math, science, writing) or a more general learning application (e.g., digital literacy). Some teachers reported reflecting on their own professional learning prior to this study but none reflected on their personal learning before study participation.

When asked about their learning experiences, teachers reported they often had difficulty separating their learning for personal reasons versus learning for professional reasons (i.e., all learning focused on enhancing their teaching). In artifact analysis, 38% of data (representing nine of the 11 teachers) referenced confusion related to isolating personal and professional learning (e.g., “I haven’t made much progress, but I was able to think about [my personal

learning] today during our professional development day and actually devote some intentional time to reflecting…" Jane_C3_021618). Professional versus personal learning coding revealed data supporting *DLIS* categories of *Attitude* – digital learning beliefs and perceptions, *Knowledge Achievement* – increase in DL knowledge, and *Efficacy* – perceived DL ability.

Study participants provided specific examples of personal learning, professional learning, and comments associated with difficulty differentiating the two learning types. To assist participants in better recognizing how they use DL to learn, I began encouraging some participants to reflect on their personal learning in different ways. Guided by reflection questions, Elise explained, "I found several online sources, including social media, which are related to personal topics of interest. Using these allowed me to explore technology from a different perspective. I was still learning information, but it wasn't necessarily for my classroom" (Elise_C2_022118).

When given similar reflection questions, Camille commented, "Right now I'm learning how important it is to take this journey slowly to ensure understanding...I'm learning how broad digital literacy is as a topic, and how much our future generations need to be prepared for with learning through technology" (Camille_C5_020918). Camille's reflection highlights the benefit intentional reflection had on her learning for both herself and her students' growth, further emphasizing the need to reflection in PD.

Jane gave a somewhat different perspective than her colleagues explaining:

> To be honest, I don't know if/when I will be able to become a learner again in the way I once was…in a quiet space where I have the time and the energy to really engage in new learning. I may just have to accept that my preferred mode (distraction-free with plenty of time) is just not a reality, and instead I just need to embrace that all the 'distractions' are just part of the learning now. (Jane_R7_050818)

Jane acknowledges the impact of DL on her learning but appears unsure of where she fits as a learner within the DL mode of learning. Coupled with the impact Jane perceives DL having in the classroom, Jane appears conflicted regarding DL.

When asked about his learning regarding DL, Geoffrey replied, "No apparent changes. I am Skyping with the Big Ideas text[book] people tomorrow to find alternative ways to present content with their program" (C2_021918). Geoffrey repeatedly tells me he, "is not a computer literate person and at this junction in [his] career [is] not looking to move into a new world of teaching techniques," (Geoffrey_C4_040518) but shows evidence of growth, as demonstrated in the quote above.

Study participants began this study with varying perceptions of DL with their beliefs combined with their associated DL value and ability. As their perceptions grew and changed throughout the study, so did their classroom DL integration and practice. Research demonstrates a relationship exists between teachers' beliefs about the utility of DL and their DL integration (Ertmer, 1999). A critical component of both quantity and quality of DL integration includes beliefs associated with value and ability (Inan & Lowther, 2010). Such a relationship possibly explains discrepancies between participants' perception about DL integration and practice.

Perceived Ability/Identity

A sub-theme within the personal learning versus professional learning discussion included teachers' perceptions of their ability to use DL or their perceived DL identity (i.e., Expectancy Value Theory; Wigfield & Eccles, 2000). Fifty-five percent of teachers commented on the impact of their DLI on their or their students' learning. Participants perceived ability often connected to their previous experiences and background with DL. Additionally, perceived ability also reflects teachers' new knowledge as teachers with some background may be better able to

assimilate new knowledge and gain knowledge faster. In response to a check-in question referencing accomplishments for the week, Nancy reported, “I have created Docs with links in them before, but this time I actually made a more attractive Doc, but it includes the different components of the lesson. From introduction (hook) to reflection” (C2_021718). For Nancy, the ability to enhance her “Docs” came from experience in creating them before and learning from those experiences. She further explained that, “You just gotta do it! Jump in!” (C2_021718). However, Elise shared:

> One thing I learned is that although I may not consciously think about it, I take more of a digital approach to learning. In my early years of education everything was based on a more traditional approach, but as technology became more integrated in education, I transitioned to a digital approach. (C2_022118)

As a younger teacher, Elise’s educational experience contained DL from an early age, even though she does not always think about those experiences. While study participants gained DL experience in various ways, their past experiences set them up for their current success. Research shows regardless of other factors, teachers’ perception of their DL ability potentially affects their technology use (Teo, 2009).

Through the reflection process, teachers commented on both their perceived ability and identity related to DL as well as experiential influences impacting their DL learning. As explained by Wigfield and Eccles’ (2000) Expectancy Value Theory, someone’s belief on how they will do on an activity (ability) and the value they associate with that activity greatly influences activity completion. Such beliefs include perceived difficulty, individual goals, and perceptions of previous experiences (Wigfield & Eccles, 2000). Arguably, perception greatly influences practice, as indicated by participants unassisted links to prior DL learning experiences and perceived DL ability. Even when prompted to think about their own learning, most

reflections, both positive and negative, connected past experiences and perceived ability to confidence in classroom DL integration.

Experiential Influences

An additional sub-theme within the personal learning versus professional learning discussion involved the influence teachers' experiences and background played on their DL use (i.e., Theory of Experience). Theory of Experience (Dewey, 1938) is different from the *Perceived Ability* theme which derives from past experiences. Thirty-six percent of teachers in this study reflected on the effect of previous experiences on their current DL use.

When I gave the teachers an opportunity to reflect on their learning, separate from what they learned for their professional career, some began to recognize better their own learning, based on experiences. This reflection initiated the process of applying their learning to their students' learning. While in many instances personal and professional learning remain linked, teachers showed evidence of thinking about how they used DL for personal learning, intentionally reflecting on DL's impact when teachers took on a student role. Such reflection led to transfer to student learning.

As reflected by Katherine:

> I don't recall having any access to computers until my middle school years. Only at this time, they were used in the library to look up books…Once I hit high school, we used them more to learn programming…It wasn't until I was in the later part of my college career that I actually used the internet. It was the dial up system. It took forever!! When I first started teaching, I really thought I knew a lot about technology – how to maneuver around in programs. I am now THAT teacher that is lost and can't pick up the skill. (R5_040218)

Katherine began the study unsure of her DLI and her ability to successfully integrate DL into her classroom instruction. This perceived lack of confidence stemmed from once seeing herself as a leader in DL integration to now no longer feeling current or as capable as her students. Due to

various reported obstacles, such as time and resources, Katherine did not have the opportunity to hone the skill set she once perceived she obtained. Furthermore, she did not know how to further develop and grow her DL skill set. Through coaching, Katherine was better able to see her capabilities and feel more confident regarding the DL she already implemented in her classroom. Additionally, I provided resources to help her grow and develop in a manner appropriate for her DLI. As evident by her pre-post *DLIS* results and artifact analysis, the provided coaching impacted not only Katherine's DLI but also her feelings of competence and confidence in her ability to successful integrate DL into classroom instruction.

Katherine's baseline *DLIS* results and early reflection on her learning, indicating a perceived low DL ability, surprised me as I learned more about her DL background. Research indicates experience associated with DL significantly changes a learner's expectations and enhances performance (Bulger et al., 2014). Various factors could cause Katherine's mindset change (e.g., leaving the classroom for administration, leaving public school for the private school setting with less PD). One possibility, as explained by Elise during a weekly check-in includes, "Just like many other things…If you don't use it, you lose it" (C6_032118).

When developing a PD model aimed at DL integration, creators should consider the potential positive outcome of first helping teachers reflect on the impact of DL to their learning prior to thinking about their students' DL use. Such reflection assists teachers in taking a student role in the learning process. For example, during one check-in Camille commented, "I reflected on the process that I took to learn something new and tried to see how my students could follow similar steps" (C6_021518). During the following week's check-in Camille shared, "I'm learning my students process better when they read digital texts if they take notes with pen/pencil at the same time…I catch myself doing the same though. There's got to be something to that…"

(C7_022218). Upon personal DLI recognition, the transition to classroom instruction appears to become stronger and more valued.

Increased Study Participation

During the focus group, I asked participants what would increase their participation in the coaching-based PD. Participants shared they would like to have a way to collaborate with others involved in the coaching process to discuss the resources they receive and classroom implantation of these resources. This collaboration would serve as an additional resource to the coaching and reflects goals of quality adult education (i.e., Andragogy; Knowles, 1978). One participant shared the weekly check-ins added too much with an already full teaching load, but other participants (N=4) shared they liked the check-ins as it provided a time to reflect. Lastly, participants reported they would like more coaching during the summer and less during the school year. This discussion led to a recollection that busy summers provide insufficient time for teachers to complete the PD necessary to stay current in the field. As such, participants came to the consensus that the coaching timeline, with flexibility, remained the best option.

Most Influential Aspects of Professional Development

In response to research question #2, What aspects of PD were reported as most influential by teachers as measured by self-report, I used thematic analysis to interpret influential elements of coaching-based PD within the themes presented by the data as well as focus group data (organized in a timeline). I developed this coaching model to fit the six characteristics of Andragogy (Knowles, 1978) as conceptualized by Alaniz and Wilson (2015). These characteristics include; recognizing adults as internally motivated and self-directed, helping adults bring life experiences and knowledge to learning experiences, creating a goal oriented focus, identifying the relevance of each learning experience, providing practical methods for

implementation, and treating adults with respect. With this protocol in place, relevant themes that emerged regarding influential coaching aspects include: self-paced and indidualized coaching, the influence of background and experience, focusing on goal setting, and practical methods for implementation.

Recognizing Adults as Internally Motivated and Self-Directed

Teachers have busy schedules and an optimal time for PD does not appear to exist, even with a coaching model of PD. Knowing this, I created my personal learning resources as self-paced and individualized. My teachers participated as much as possible each week and I supported further participation by choice within each personal learning email (see Appendix K). I felt it important the teachers did not feel overwhelmed or inhibited by the resources I provided. For example, Erin noted, "This time to reflect has been essential, and it is amazing to have someone sending you bite-sized, curated resources each week – love it" (C1_020118). Furthermore, no matter how strong of a relationship exited between myself and each teacher, they knew best what they needed or could handle any given week.

In response to my method for delivering personal learning resources, the teachers reported they appreciated the ability to choose what resources they wanted to partake in and the amount of information they gained each week. Additionally, some teachers reported they liked the flexibility coaching provided and would not have benefited from the study nearly as much with inclusion of more required elements (i.e., "Rather than having to complete all of these resources, and being overwhelmed, I learn what I need when I need it, no pressure" (Erin_C8_031518). Requirements would have made the resources appear more as a to-do list or required boxes to check, which would have limited the impact. Lastly, some teachers reported

without the self-paced coaching nature, they would not have had the time to reflect and as a result, would not have learned as much.

Assisting Adults in Bringing Life Experiences and Knowledge to Learning Experiences

Adult learners, as explained Knowles (1978), bring life experiences and knowledge to their learning (Alaniz & Wilson, 2015). The teachers in this study acknowledged their life experiences and the impact these experiences have on their own DL learning. Realizing adults learn differently than children, I modified my approach to help participants learn to recognize and learn from their backgrounds and experiences. In this appraoch, I also worked to have my participants keep their identity of "learner" more salient than their identity as "teacher". Through this modification, I attempted to assist my participants in making connections to their students' learning. Linked experiences and current learning helped participants begin to better recognize their DLI. Thus, they better recognized how their experiences, achievements, challenges, and feeling of being capable (Casey & Bruce, 2011) significantly impacted their mindset regarding their perceived ability to use DL to learn (Brumberger, 2011; Gee, 2017). Teachers reported various support aspects aligned to their identity development and recognized influences on their identity (i.e., empowerment, reflection, making connections from their learning to student learning, and available resources). Additionally, participants discussed how the support aspects influenced their identity (i.e., "I honestly feel like I've learned so much! I was reflecting with a partner teacher yesterday and I realized all the information I've gained regarding digital literacy lately" (Camille_C10_032218).

Creating a Goal Oriented Focus and Identifying the Relevance of Learning Experiences

After completing the *DLIS* at the beginning of the study, I asked my teachers to create goals for the study based upon their *DLIS* results. In multiple personal learning resource emails, I

also asked my teachers to reflect on the goals they created. As teachers achieved the goals they set, I encouraged them to amend their goals based upon their learning to that point. As indicated by both survey results and artifact analysis, goal setting influenced participants ability to stay on track during the study. Moreover, goal setting raised feelings of accomplishment as the study progressed.

Teaching Application Connected to Student Learning - Relevance

Student DL learning represented the second most prevalent theme in data analysis. In total, 20% of data (nine out of the 11 teachers) contained elements highlighting student learning. This type of learning was beyond the focus of the *DLIS* and captured only through discussion and feedback with teachers.

Originally, when coding data, I had separated student learning and teaching application. As I analyzed the data, it became difficult to discern student learning from teaching application even after I created definitions for both. I determined since teaching application led to student learning, and my study did not include working with students to determine the impact from their perspective, combining the two themes to form one theme was more effective in telling my participant's story.

The teachers reflected on teaching applications of DL on student learning from various approaches. These approaches included; (1) holistically (e.g., "Students need to have more freedom…to explore more than just the assigned sites." (Katherine_C1_020518)), (2) learning to increase classroom instruction (e.g., "I also wanted to do more research about using technology to form a bridge between 'in-class work' and 'home learning.' Something that would allow students to practice Spanish at home, but I would be able to see their progress" (Elise_C3_020818)), (3) teacher influence ("If students can learn from passionate teachers the

lesson become more engaging. The more we explore our learning and grow, the more our students grow. It reminds me of the book 'Teach Like a Pirate'" (Nancy_C7_040818)), and (4) coaching influence (e.g., I think [professional development resources are] making me slow down…It's making me more patient with myself and others, yet I feel that I'm finding more success and getting more accomplished. (Camille_C4_020918)).

Although the focus of the coaching was on personal growth, teachers consistently included student learning in their reflections indicating that student learning remains their key PD focus. For example, Nancy shared, "Loved playing a trick on my students on the 'Tree Octopus'. They were really upset when they found out it was fake. It led to a great conversation on having to check your sources and how easy it is to believe fake news" (Nancy_C7_040818). Additionally, some participants commented on how the resources I sent assisted them in making connections between their learning and their students' learning, which supports my original intent in sending such resources. For example, as expressed by Jane when commenting on a resource I sent on using Skype to learn:

> I think that my weakness is that I don't always think of using Skype as a possible resource, and it would take some planning and advanced communication to set up a connection. If it did come to mind to use, then there's a good possibility that it might be too late to set it up…Now that it's on my radar screen, I might look forward to see if there are ways I can use it for future lessons/activities (Jane_R1_020518).

Providing Practical Methods for Implementation

Digital Literacy Support

To sustain the coaching model and enhance life-long learning after study completion, I provided practical methods for implementation, such as activities applicable for teacher and student learning. Practical implementation, based on respect for the learner, ensures the model

maintained the original goal for choosing coaching over traditional PD forms. These practical methods derived from various forms of DL support through the course of the study (17% frequency among four out of the 11 teachers). Participants discussed the support I gave through coaching, but also shared support received from peers and students. Receiving support aligns with the *DLIS* category *Knowledge Sources* as support often provides resources for learning. Giving support align with the *DLIS* category *Knowledge Achievement* demonstrated through sharing with others. Furthermore, learning through reflection aligns with the *DLIS* category *Self-Regulated Learning*. As indicated by the United States Department of Education (2017), "Educators should be collaborators of learning, seeking new knowledge and constantly acquiring new skills alongside their students" (p. 7), further indicating teachers benefit from collaborating to learn.

Participants highlighted coaching support by directly commenting on a specific resource I sent (e.g., "This tracking my tech resources (Appendix S) has helped me get out of a spring break rut – just the intellectual stimulation I needed so thank you, yet again!!!" (Erin_C8_031518). Other participants reflected on how the resources I sent impacted their thinking (e.g., "Today I watched the video that you sent me. The teacher in the video made some points that I knew were true, but I hadn't really let them set with me…This was great to think about" (Katherine_R2_021218), and "I think that just participating in this study is helping me to make my technology use decisions more intentional and I have a greater awareness of when, how, and why I am using technology in my classroom and my personal life" (Jane_C2_020518)).

The teachers also reported numerous instances of support from others. The third professional learning email I sent challenged each teacher to begin to find a support group for themselves. I provided guidelines and guiding questions to assist the teachers in choosing a

sustainable support group, as well as various opportunities for support (e.g., peers, social media, blogs, and webpages). I designed this activity to help teachers establish a learning community to supplement the provided coaching as having additional support is helpful. Additionally, as the study was anonymous, participants did not receive direct support from one another.

Of the teachers who chose to participate (N=7), most chose peers who also worked at Learning Academy. Two participants additionally chose peers who worked at other schools and four participants began joining social media groups for support, in addition to finding peers at Learning Academy. Through the activity of establishing a learning community, the teachers reported they appreciated this activity because it provided resources to access upon study completion.

Learning through Reflection

Another coaching aspect implemented for this study includes using reflection to learn. Self-regulated learning focuses on knowing how to monitor your learning (Bjork et al., 2013) by tracking strengths and weaknesses, and working to further develop weaker areas for personal achievement **(**Greene et al., 2014**).** Such tracking requires reflection for development. When teachers reflect on their motivations for DL learning, it may increase metacognition, promoting reflective practice (Hobbs & Tuzel, 2017).

Knowing the necessity of reflection in this study for my participants to regulate their learning, I intentionally integrated time into each weekly personal learning resource for teachers to reflect on their learning and make possible connections to their students' learning. Teachers often do not give themselves time to reflect and the experience provides a beneficial learning experience, especially in written form (Miller, Scott, & McTigue, 2016). Study participants noted the benefit of reflecting on their learning in various capacities within their artifacts (3% of

data among six out of the 11 teachers). They reported, similar to Erin, that "Man I clearly needed this place to reflect. Thanks for asking me thoughtful questions. I'm really going to miss this [study]!!" (Erin_C15_071918).

Reflection in this study came from weekly check-ins, goal setting, and email correspondence. Such artifacts often detailed perceived participants' growth. As noted by Katherine:

> So going through this process, I view digital literacy differently. When we first started, I was thinking of it as just technology reading or working in the classroom. After watching videos, reading articles, looking through your learning activities, etc. I realized that it encompasses so much more. I didn't think that I used it very often; however, I actually use it more than I thoughts. I also feel more comfortable with approaching it with my students. (R6_041018)

Additionally, Patrick shared, "The goal setting helped me focus and concentrate on ways to utilize digital literacy into my planning and lessons" (I2_051218). As noted by Bulger and colleagues (2014), regardless of DL use and application, recognizing why and how improves ability and understanding. Intentional reflection for this study focused on the why and how associated with each professional learning resource.

During the focus group, I asked participants what coaching aspects they felt most influenced their progress. Participants shared the most influential coaching aspects included; emails (N=6), weekly check-ins (N=5), and goal setting (N=2). I intentionally used various support methods within the coaching model to assist in supporting all participants.

Classroom Transfer of Digital Learning Identity

Research question #3, Do changes in teachers' DLI transfer to changes in how they integrate DL within their classrooms as measured by self-report and artifact analysis, was designed to begin the discussion around the impact of DLI recognition if reflected in classroom

DL implementation, possibly leading to enhanced student learning. Upon data analysis, relevant themes that emerged regarding DLI transfer included: DL tools and skills, and using DL for consumption versus production.

Digital Literacy Tools and Skills as a Primary Focus

While I never asked participants about specific tools, various DL tools came up in study artifacts. Upon data analysis, 100% of study participants provided data focusing on DL tools. Of the artifacts collected, 20% of reflected comments focused primarily on specific DL tools they use for both personal and student learning. For example, Patrick shared, "Finding different strategic ways of holding students accountable for literacy learning during independent learning activities. I want to continue learning more in-depth, google classroom and hyperdocs" (C1_040518). Additionally, Nancy commented, "The day goes by, I have all intentions to tweet out, but then if I don't do it that day it feels meaningless. Kind of silly to think that one day is too late already…we are living in a time of instant gratification." (C4_031818). A large amount of additional data named specific DL tools such as, Google docs, NewsELA, Hyperdocs, WebQuest, and YouTube. Comments associated with tools follow similar function to the above quotes by Nancy and Patrick. Participants demonstrated use of various DL tools and searched for additional resources for classroom instruction.

Digital Learning Integration Matrix Analysis

Using the Digital Learning Integration Matrix, I evaluated all artifacts for change in matrix elements. I began by dividing the artifacts (organized by participant) that mentioned classroom DL integration into two sets. Set one included artifacts (e.g., goal setting sheets, weekly check-ins, PD reflection, and emails) collected January through April (halfway through the study) and the second set included artifacts collected May through August. Holistically, 64%

of participants (N=7) demonstrated some growth in the way they integrated DL into their classroom. This growth included a shift in students using DL mainly for consumption to students using DL more for production. For most participants, results demonstrated small growth (20-25%) regarding both quality and quantity of DL, with the greatest increase being 46% for one participant (e.g., Katherine's overall matrix score grew from 27 to 59). These results indicate assisting teachers in recognizing how they use DL to learn possibly has a small impact on classroom DL integration.

Furthermore, the teachers reflected on their personal DL learning and its connectedness to professional and student learning in their artifacts. In the collected artifacts, the qualitative content analysis brought out three prominent discussion topics. The most common topic included the awareness stemming from intentional separation of professional and personal DL learning methods. This topic was followed by a focus on digital tools and support through various forms (i.e., peers, students, and coaching). During each professional learning experience, I asked the teachers reflection questions based upon their personal learning in the context of the experience. I will discuss their reflections, broken down by categorized themes, in detail below.

Additional Themes Contributing to Growth

While DL obstacles and digital native discrepancies resulted in common themes throughout the artifact analysis, they proved indirectly relevant in answering the research questions for this study. However, these themes present components important to consider for PD conception.

Digital Literacy Obstacles

Obstacles presented themselves in many artifacts within data analysis. Related to *DLIS* survey category *Challenge*, obstacles potentially challenge teachers in both negative and positive

manners. Fourteen percent of collected data contained wording focused on obstacles associated with DL, with 64% of participants including DL obstacles in their collected data. Other obstacles included in the data related to teaching, but not directly related to DL.

Artifacts featuring obstacles related to DL focused on obstacles both teachers and students encounter when using DL to learn. For example, Katherine highlighted how changing technology has impacted her teaching, noting:

> When I first started teaching, I knew the technology and kept up with all the 'fast' moving items that [were] being pushed out. I even chuckled at the older teachers that were lost and couldn't' comprehend how they couldn't pick up the skill. It was simple – right? You won't break it – you have to try it at least once. Well guess what – I am not THAT teacher…Today, as a 44-year-old, I just can't keep up. I feel like I am drowning in the technology pool. I can't seem to catch up. I feel so far behind and I don't' know how to help my students. Honestly, I'm scared to help them. I don't like trying or doing something that I am not good at. I want to push forward with my students; however, I don't even know where to begin sine I feel inadequate with technology myself…I lean a lot on my own two kids at home and even my third graders in class. They are sponges and just get it (like I used too). I am just dumbfounded how technology changes daily and how it will continue to change. (R3_022118)

Additionally, later in the study, Katherine commented on how obstacles for teachers overlap with student obstacles. Katherine explained, "As a teacher, we are given the task to prepare our students in ways that we weren't prepared. I am having to learn to teach in ways that I didn't even 5 years ago. This is a scary, but challenging task to have" (R4_032618).

Other obstacles teachers mentioned include; funding for resources (e.g., "I would like to find local or state grants available for classroom technology" (Elise_C4_022218)), different opinions related to DL learning (e.g., "Trying to balance my own viewpoints on how I feel teaching should be conducted against the viewpoint the school has promoted" (Geoffrey_C3_030918)), and time (e.g., "I don't want to be a downer; however, can you tell me how many more weeks we will be doing this project? With the end of the year coming up we

have a lot going on and I don't feel that I am doing a very good job with this project" (Katherine_E3_043018).

Digital Native Discrepancies

Teachers in this study mentioned students' discrepancies they observe regarding DL (4% frequency among two out of the 11 teachers). This theme goes beyond the constructs captured by the *DLIS*. Often, participants would make comments noting perceived inability in their students' DL learning, which they found surprising. They made assumptions today's students should be more digitally literate. When students appear less digitally literate than expected, it can come as a surprise (e.g., "In today's world, the students are surrounded with technology, so you would assume that they would know how to use it…[the students] know how to do Facebook, Twitter, Instagram, etc. but they do not know research or what is good research." (Katherine_R2_021218)). Such surprises made my participants pause to make connections between their DL learning and their students (e.g., "I am learning that my students are as unsure of their digital learning process as I am of mine!" (Camille_C8_031118). As shared by Elise:

> Recently I witnessed a situation in which a student was using a school computer to cyberbully a classmate. After having discussions with the students, their parents, and other teachers, it became apparent that the student who was being the 'cyberbully' has not had much experience with technology in a classroom setting. He seemed to believe that his actions could not been 'seen' or 'traced' as long as he deleted them. Being such, I have looked for resources geared toward students to effectively explain digital footprints, as well as to encourage responsible technology use. (C9_050118)

Elise's comment associated with digital native discrepancies, while still confirming students lack the DL skills she expected. Her comment focused more on the ethical need for students to be versed in digital citizenship.

As I observed my participants appearing to become frustrated with discrepancies between what they believe their students should know, regarding DL, and what they produced, I asked my

participants to talk to their students about how they learned using DL. This activity mirrored where I had asked my participants to reflect on their own learning many times throughout the study. I hoped this exercise would assist in furthering the value they associate with recognizing DL use for learning. After the exercise, Elise noted in her weekly check-in:

> … I have asked my older students (4th and 5th grades) about their technology preferences. How do they like to learn? What works best for them? Would using different types of technology be beneficial to them in the classroom?…For the most part their answers were what I expected. Many of them prefer to use computer or tablets at school to complete research and writing assignments because it is quicker and easier. A few of them mentioned that it is more fun to use programs…when completing projects. Several students agreed that using technology is better because they don't have to remember as much information since they can quickly find what they need. The same group of students shared that they use technology for most extracurricular activities or hobbies even if it is just listening to music. My younger students (3rd grade) had slightly different answers. They enjoyed using technology outside of school for personal use but are more ambivalent about it in the classroom. A few students explained that for them it is more difficult to complete assignments when using computers or devices because it limits their options. They have preferred methods of using computers and devices, but in the classroom, they are given specific guidelines or processes. (C5_031418)

Erin also asked her students their thoughts on DL learning, wondering if the content or instructor played a role in their responses. Erin shared:

> I talked to a crew of students that was a mix of 9th-12th grade. This particular group is a highly motivated group of student leaders. They said they like digital math and that they use the website resources way more than they would the textbook. Although some glitches can be annoying, and they don't like that they can't get partial credit on the digital quizzes…For history, there were mixed reaction about the summit platform. Some really liked the resources and freedom while others preferred to read the textbook and have class discussions, wishing it would go back to a traditional model. For English, they said they loved hyperdocs, but then again, they were talking to me so they may have just been pandering to their audience…For Science, they only thought of some online physics labs as digital learning and felt meh about them. Outside of school, one student said she loved using Duo lingo to learn languages. One said he would use Quizlet on his own to help with math. (R3_030518)

Both Elise and Erin's reflection on the discussion they had with their students reflect the impact of DLI recognition for learning. While in this case, the reflection was for students, both teachers

indicated better understood of their students' needs and learning after these discussions. Furthermore, both Erin and Elise applied these reflections to their classroom DL integration.

Limitations and Future Directions

While the results of this study largely support coaching to enhance teachers' DLI, limitations remain. Originally, I planned to collect lesson plans at three designated points in the study. Lessons plans would then be analyzed using the Digital Learning Integration Matrix. Due to Learning Academy changing their policy on lesson plans and no longer requiring teachers to turn in lesson plans or have a designated lesson plan format, inconsistencies occurred. Some lesson plan examples contained detailed procedures while others included a few bullet points with little detail. Even with asking follow up questions after collecting lesson plans, inconsistencies remained. Due to these inconsistencies, I chose not to include lesson plans in the analysis. Future researchers may want to collect lesson plans and potentially conduct classroom observations as additional artifacts for integration to further assess DLI classroom transfer.

Collected lesson plans should be analyzed for theme but also aspects of DL consumption and production. For such an analysis, an appropriate instrument is needed. While the Digital Learning Integration Matrix proved beneficial in this study for analyzing DL artifacts for evidence of consumption versus production, research needs to validate the Digital Learning Integration Matrix as well as include a larger sample to evaluate. Such validation will increase the benefit of the matrix for all artifact evaluation, including lesson plans.

Moreover, in a traditional coaching-based PD method (not for research), it would potentially prove useful to allow participants more choice in the coaching methods available. In this study, I gave participants choice in the way they checked in each week but for some, weekly check-ins proved too much for their available time. Even though I repeatedly told participants to

only complete what their time allowed, some participants explained they considered it "unacceptable" for them to do incomplete work.

Lastly, the themes of DL obstacles and digital native discrepancies repeatedly emerged during data analysis. As such, they remain important to consider for PD conception as teachers perceive them as a piece of their DL development. Teachers' reflections also indicated obstacles and discrepancies are areas needing addressed.

Conclusion

The purpose of this study was to test the efficacy of a PD based coaching model for increasing teachers' personal DL use and measure the extent increasing teachers' DLI will increase their classroom DL integration. My results indicate PD aimed at DLI recognition and development increases teachers DLI. These findings suggest coaching-based PD, aimed at supporting teachers' goals for their digital learning growth, affects teachers' learning and as a result, students' learning regarding the quantity and quality of DL. Additionally, coaching-based PD, focused on aspects of quality adult education, increases both teachers' recognition and enhancement of their DLI.

Furthermore, while we can coach and provide PD on DL learning, we cannot completely escape DL tool integration. Teachers worry about the pace of DL growth and an inability to stay current with tools available to them and their students. Arguably, this discussion lies outside this study's scope but helping teachers assess DL tools is a much more effective use of DL based PD than PD on various DL tools for classroom use. DL tools continually change, often outdated before time for follow up on the PD provided occurs.

Different than a typical PD, the coaching model instituted in this study focused on quality

adult education aspects empowering adults as self-directed and self-managing learners (Guglielmino, 1993). This model gave participants PD methods that instituted elements of choice related to their needs (Cave et al., 2006). Teachers in this study appreciated the individualized nature of coaching-based PD and as a result, two participants (Erin and Camille) requested a continuation of the coaching process as they want to further increase their DLI and explore how their learning transfers to their students' learning. These requests for continued coaching suggest this model provided intrinsic motivation to engage in DL based PD.

Together, the findings of this study suggest coaching-based PD effectively supports DL recognition and development for in-service teachers. Furthermore, we must consider aspects of teachers' identity (e.g., gender, experience, background) when developing PD aimed at increasing DL integration.

CHAPTER IV

TEACHER MOTIVATIONS TO CHANGE CASE STUDY: SHIFTING COGNITION AND AFFECT REGARDING DIGITAL LITERACY INTEGRATION

Introduction

Informed by the analyses conducted in Chapters II and III, this chapter's case study research qualitatively explores the belief systems, barriers, and motivations of participating teachers to change their digital learning identity (DLI) as well as the quantity and quality of digital literacy (DL) integration in their classroom. I further seek to identify the factors leading to change in DL integration and teachers' DLI. Previous researchers document that teachers perceive that their insufficient preparation underscores a lack of classroom DL integration (Kalman & Guerrero, 2013). Teachers also perceive their digital ability links to technology use (Timothy, 2009). For example, teachers who perceive themselves as digitally illiterate use technology less. Yet, regardless of such research findings, limited research analyzes teachers' ability to recognize or change their personal DL cognition and agency. However, I argue that without facilitating teachers' positive cognitions and efficacy about technology, no amount of digital tools in the classroom will result in meaningful change. Therefore, in this present study, I conduct such an analysis to derive patterns linked to recognition and change regarding DLI. Specifically, I conducted a coaching model of professional development (PD) aimed at enhancing teachers' DLI to increase classroom DL integration.

I chose a qualitative research design due to its appropriateness when the research purpose is descriptive, exploratory, and/or explanatory and questions aim to address what, how, and why (Hesse-Biber & Leavy, 2010). The exploratory nature of this study (to explore motivations of

teachers towards enhancing their DLI) makes the qualitative approach most suitable. I used semi-structured interviews along with artifacts I collected to create portraits of study participants. This approach allows me to explore participants' experiences and perceptions, as well as the effectiveness of delivered PD. Qualitative analysis also enables a better understanding of how participants make sense of their experiences (Merriam, 2009). Specifically, the experience was how coaching based PD, and how that affects personal learning, guided by experience, and classroom DL integration.

This study goes beyond the quantitative analysis and the behaviors considered in Chapter III by now looking at the motivations, cognition, and barriers teachers experience. Information related to these experiences proves essential to help teachers change. Without this information, I simply infer from the numbers. To create change, I need to understand better the motivations and obstacles associated with change to more thoughtfully design PD and prepare teachers for 21st century education (i.e., digital literacy), I must recognize not just what worked, regarding change, but why it worked. In the following sections, I detail factors related to changing behaviors in teachers. These factors incorporate motivation to change and knowledge and beliefs associated with change.

Factors Related to Change

Research indicates various factors influence change in teacher instructional practices. Such factors include; school context (i.e., socio-economic status, workload, administrative support), individual factors (i.e., motivation, self-efficacy, self-reflection, openness to change, initial knowledge), and staff development factors (i.e., relevant content, active learning opportunities in staff development, follow up) (Ottley, Piasta, Mauck, O'Connell, Weber-Mayrer, & Justice, 2015; Sahin & Yildirim, 2015). With many indicators possibly linked to change, I

prioritized measurable and malleable factors for this study. Ottley and colleagues (2015), offer educators' initial knowledge and beliefs, self-efficacy, and openness to change as most measurable.

Motivation to Change

Research conducted by Knight (2007) led to the conclusion that teachers seldom resist change, which runs counter to some "common wisdom" about PD. Instead, Knight described how teachers resist poorly designed or insufficiently thought out change initiatives, which is a very different situation. Such initiatives often result from quick fix ideologies with limited research-based solutions. Patterns of ineffective initiatives cause decreased motivation to change (Knight, 2007). Conversely, three factors primarily influence motivation to engage in any activity; beliefs related to ability and efficacy, incentives, and achievement goals (Wigfield & Guthrie, 1995). Such motivation remains necessary for change in beliefs and/or understandings to occur (Ostinelli, 2016).

As motivation constitutes one component of Expectancy Value Theory—value motivates individuals (Fan, 2011)—if teachers find value and a sense of ownership and empowerment (Lukacs, 2015) regarding DL use, they may experience greater motivation to change their DL perspective. Furthermore, attitudes, skills, and habits, as contributors to DL motivation, potentially influence a teacher's motivation to change their classroom practices (Hobbs & Tuzel, 2017). Motivation may also contribute to differences in DL integration (Hobbs & Tuzel, 2017). Such motivation impacts the amount of change that occurs. Therefore, if administrators and literacy leaders give teachers opportunities to reflect on their motivations guiding both personal use and classroom integration of DL, as value increases greater change may occur (Hobbs & Tuzel, 2017; Smith & Gillespie, 2007).

Knowledge and Beliefs about Change

Measurable factors possibly linked to both teachers' personal and instructional change include initial knowledge, values, and beliefs (Ottley et al., 2015). Pajares (1992), defines beliefs as "based on evaluation and judgement" and knowledge "based on objective fact" (p. 313). Learning, at its foundation, involves both prior knowledge and beliefs to make meaning and construct new knowledge (Ottley et al., 2015). However, it is insufficient to solely focus on increasing DL knowledge when trying to determine the influence of beliefs on change (Talbot & Campbell, 2014).

Learning identity may better help determine the influence of teachers' knowledge and beliefs regarding change. While learning identity links to both active and relational factors (i.e., Learning Identity Theory; Gee, 2017), efforts related to change possibly affect a teacher's identity (VanVeen, Sleegers, & van deVen, 2005), in relation to this study, change in DL integration. For example, if a teacher develops and implements a successful lesson involving DL, their perception of their digital competence may increase based upon gained knowledge, the positive experience, the possible increased value from the experience, and beliefs concerning the impact of DL integration.

Therefore, essential components to consider when evaluating change include both teachers' knowledge and beliefs (Ottley et al., 2015). Knowledge and beliefs constitute interrelated concepts with knowledge potentially becoming less important as it conflicts with beliefs (Ottley et al., 2015). Consequently, teachers' beliefs have the greatest influence on personal and classroom practice (Hobbs & Tuzel, 2017).

Purpose

In this study I seek to determine which factors motivate teachers to change both their DL learning and classroom DL teaching practices. Additionally, I seek to identify which obstacles (external or internal) slow or prohibit change. Change comes as a result of various factors, but the factors must be grounded in authentic, rich experiences, influencing both current and future experiences (Dewey, 1938). I summarize the research questions, data sources, and analyses of this study in Table 4.1.

Methodology

Narrative Inquiry

I used a narrative inquiry approach for this study (Clandinin & Connelly, 2000). Narrative inquiry allows me to collect rich, descriptive, experiential data in three-dimensional space. This three-dimensional space comprises sociality (thoughts and reactions), temporality (past, present, and future), and place (where events occurred). These dimensions allow teachers to reflect on the narrative threads of their lives and experiences from both an inward and outward, and forward and backward perspective (Clandinin & Connelly, 2000).

Furthermore, narrative inquiry allowed me, as the researcher, to serve as an active participant in both data collection and creation while still maintaining a researcher mindset. Narrative inquiry also empowers my participants to become active creators of their final story developed from their experience through re-storying. The process of creating stories and re-storying embodies the research that best attempts to answer the questions posed by this study (Table 4.1).

Table 4.1

Study 3 Research Questions and Analyses

Research Questions	Data Sources	Analysis
1. What are the motivations of teachers towards shifting their digital learning identity as measured by artifact analysis and self-report? 2. What are the motivations of teachers to shift cognition and affect regarding elements of digital literacy integration in their classroom as measured by self-report?	• *DLIS* Survey Version 3 administered to Learning Academy teachers in January 2018 • *DLIS* Survey Version 3 administered to Learning Academy teachers in August 2018 • Semi-structured, in-depth, interviews with 3-5 teachers in February 2018 (purposeful sampling) • Semi-structured, in-depth, interviews with 3-5 teachers in May 2018 (purposeful sampling) • Semi-structured, in-depth, interviews with 3-5 teachers in August 2018 (purposeful sampling) • Weekly Check-in Forms • Goal Setting Sheets collected in January 2017	• Guided by Glaser and Strauss's (1967) Grounded Theory, interviews, survey reflections, and artifacts will be coded • First cycle coding (round 1)—open coding • First cycle coding (round 2) - *a priori* coding • Second cycle coding—Axial Coding • Thematic Analysis overlaid with artifact timeline

I present an in-depth case selected as it lends itself to human experience reflection (Stake, 2005). Furthermore, this method allows me to "[concentrate] on experiential knowledge…and the influence of its social, political, and other contexts" (Stake, 2005, p. 444). Finally, narrative inquiry permits me to construct narratives through interviews and participant journaling (e.g., check-in forms and PD reflections). Not only does this process provide multiple sources with which I can triangulate findings and provide validity for the analysis (Stake, 2005), it also provides for a completed analysis within each narrative and across multiple case narratives (Chase, 2005).

Narrative inquiry includes various tools that allows me to "excavate teachers' knowledge in context" (Craig, 2012, p. 91) to create stories of experience. The data sources I chose for this

study include in-depth participant interviews and analysis of participant weekly check-in forms, professional learning reflections, goal setting sheets, and *Digital Learning Identity Survey* (*DLIS*) results. Multiple tools allow for the divulgence of participants personal practical knowledge through their voice. Clandinin (1992) describes voice as knowledge reflective of the participant's prior knowledge developed and retold through the process of reflection in the three-dimensional narrative space. I collected interviews and reflective entries (i.e., participants' voice) at multiple points along this inquiry to examine changes occurring over the eight-month study duration.

I used the following methods to measure each factor, referencing Ottley and colleagues' (2015) measurable factors of change (educators' initial knowledge and beliefs, self-efficacy, and openness to change. "Openness to change refers to the degree to which they are willing to entertain new information, try new instructional methods, and risk making mistakes" (Ottley et al., 2015, p. 48). Additionally, PD involvement potentially indicates openness to change (Ottley et al., 2015). I measured openness to change using participant weekly check-in forms, goal setting sheets, and interviews, as Expectancy Value Theory relates the influence of both expectancy of success and value associated with an activity (Wigfield & Eccles, 2000). Furthermore, I measured initial knowledge and beliefs as well as self-efficacy through both artifact collection and *DLIS* results. Artifact data also informed teacher's reflection on values and expectancy for success, impacting change.

I continuously engaged in the practice of reflexive journaling and member checking (Guba & Lincoln, 2005) to ensure this study remained true to storying the experience of the participants. This form of journaling allowed me to reflect critically on my actions as a researcher (Guba & Lincoln, 2005, p. 210). Member checking allowed study participants to verify my interpretation of their experiences and clarify any misunderstandings, errors, or

assumptions I made without appropriate support from the collected data. The ongoing negotiation of these interim texts, by myself and the participants, enabled shared construction of the final narrative (Clandinin & Connelly, 2000).

Additionally, I transcribed all interview data into written text for analysis. In narrative inquiry, interview transcripts constitute field texts. Because no rigid, defined format for the final product of a narrative inquiry research text exists, a continuous negotiation, regarding the form, exists between myself and the participants. Field texts weave into the written narrative "story" of the participants. This iterative process of reading, giving a response, undertaking revisions, and sharing texts again remains at the heart of narrative inquiry and demonstrates a critical step in determining the final "story" of my participants (Clandinin & Connelly, 2000). I created these final stories, using portraiture methodology, through data collected from interviews and artifacts.

Portraiture Research

I chose portraiture, as a method of qualitative inquiry research, to guide me as I "create[end] a narrative that bridges the realms of science and art, merging the systematic and careful description of good ethnography with the evocative resonance of fine literature" (Lawrence-Lightfoot, 2005, p. 6). In pure research, the researcher acts as "the consummate skeptic" trying not to let personal influences shape the inquiry process (Lawrence-Lightfoot, 1983, p. 14). Portraiture permits the same "inclinations to flourish" with less concerned regarding anticipated problems and attempting to capture the "insider's view of what is important" (Lawrence-Lightfoot, 1983, p. 14). Portraits seek to record and interpret a participants' perspective and experience by documenting their vision, voice, and emotions (Lawrence-Lightfoot, & Davis, 1997). Dialogue occurring between myself and the participants, placed in context, shapes documentation as the narrative is embedded in context (Lawrence-

Lightfoot, & Davis, 1997). I searched for coherence within the data by creating portraits to bring order to phenomena potentially seen as unrelated and somewhat chaotic (Lawrence-Lightfoot, 1983).

I become a creator through portraiture (Lawrence-Lightfoot, 1983), combining elements of inquiry through observations, interviews, and other forms of data collection (i.e., artifacts). I used combinations of inquiry elements to describe certain phenomena. Description occurred, "while simultaneously capturing the beauty and aesthetic properties of phenomena" (Quigley, Trauth-Nare, & Beeman-Cadwallader, 2015, p. 21). Portraiture enhances narrative inquiry methods with an empirical understanding of learning contexts and processes (Lawrence-Lightfoot & Davis, 1997), making it useful for educational research. Portraiture methodology permits me to take themes coded throughout data analysis and intentionally selects the themes most relevant to answer the study research questions. I then actively searched for the selected themes throughout the data, attempting to establish their presence and relevance in the participants' narratives. Searching for themes allows me to determine what data to include and exclude, and how to make connections among the selected themes (Lawrence-Lightfoot, 1983).

Portraiture fills a need to more fully capture the cognitive, social, and affective dimensions of education related experiences (Dewey, 1933). Furthermore, portraiture finds frameworks and strategies to more accurately reflect teaching and learning aesthetics (Lawrence-Lightfoot & Davis, 1997). Connected to this study, coaching as a method of PD, serves as a framework for reflection on DL teaching and learning. Like portraiture, coaching does not document failure but searches for and highlights the good, knowing good contains imperfections (Lawrence-Lightfoot & Davis, 1997).

I endeavored to create authentic portraits of each study participant as part of this study, attending to connections between myself and my participants. Much learning occurs when I deeply examine a teacher's story as they progress through a coaching model of PD (Lawrence-Lightfoot, 1983). As portraiture relies on inductive as opposed to deductive analysis, (Davis, 2003), the methodology fits well with the grounded theory methodology used throughout this research.

Data Collection

The data collection for this research occurred during an eight-month period, starting in January 2018. I conducted this study with 4th through 12th grade teachers within a single school (Learning Academy). Learning Academy characterizes themselves as an independent school, serving 350 PreK-12 grade students (see Chapter III).

Participant recruitment began in February 2018 after participants had been involved in a related research project I conducted for one month prior (see Chapter I). I asked participants from that study to consider volunteering to participate in case study research through interviews. Volunteer participants consented for inclusion in the study and then began the study procedures. Participant recruitment occurred through convenience sampling (Patton, 2002) as I recruited all participants from the same school, Learning Academy.

I recruited participants during an informal face-to-face meeting in a small group setting. Following the meeting, I emailed each faculty member participating in my additional study at Learning Academy. This email explained this study in detail and encouraged the faculty to ask questions for clarity. Due to the highly personalized nature of a narrative inquiry approach, specifically when using a case study method, I thoroughly informed participants of their rights as a participant in this study. Furthermore, prior to providing consent, I explained participants'

ability to refuse to participate in any portion of the study, or to withdraw entirely with no penalty. I used pseudonyms throughout this study to maintain anonymity and confidentiality in accordance with the approved Institutional Review Board application.

Study Participants

Six participants originally volunteered for this study from the 11 participants included in the original study. One participant appeared unsure of committing to all three interviews, so I only included the five participants (four females, one male) who confirmed inclusion in all interviews. Participants represent multiple grade levels (4^{th}-12^{th}) and subject areas (English, Language Arts, Math, Science, and Social Studies) as Learning Academy teachers often teach multiple grades and subjects as part of their teaching assignment.

Study Procedures

I used the results from the initial *Digital Learning Identity Survey* (*DLIS)* administration (pre-scores) as a baseline for case study participants based on their knowledge and beliefs. The *DLIS* is an instrument designed to help teachers recognize their own digital learning identity (DLI). The six-factor instrument comprises 60 items and measures DL constructs of *Attitude, Self-Regulated Learning, Knowledge Sources, Knowledge Achievement, Challenge, and Self-Efficacy* on a 5-point Likert scale. Furthermore, elements related to DL and self-regulated learning (Greene et al., 2014) adequately measure the desired *DLIS* components, proving measure validity. The DLIS has undergone an extensive validity assessment and yields a reliability of 0.881. But, we cannot fully claim validity yet. See Chapter II for details.

Baseline results guided my interview questions geared toward participants' knowledge and beliefs regarding DL. I conducted semi-structured interviews in February, May, and August 2018. I designed interview questions to relate to my research questions but remain open-ended to

allow for a more narrative approach to interviewing (Appendix Q). The following section outlines the interview protocol for this study.

Interviews

After receiving signed consent from all participants, I scheduled a first round of semi-structured interviews. I created interview questions based on the work of Katz (2001) and Tracy (2012), noting that the "best interviews are characterized by a wide range of questions" (Tracy, 2012, p. 146). Open-ended interview questions for this study included behavior and action questions, data-referencing questions, member reflection questions, and identity-enhancing questions (Tracy, 2012) (Appendix Q).

During the first interview in February, lasting approximately 60 minutes, study participants and I discussed initial goal setting results. I analyzed these results for aspects of openness to change through change based questions (e.g., When you try something new in your classroom, what inspires or motivates you to make this change?). The second interview, conducted in May (45-60 minutes), reviewed reflections and study impact. Questions reflected influence of PD to that point in the study, and any additional PD involvement (e.g., Think back for just a moment to where you started with this process, what, if any, changes have you seen up to this point?). The third interview, conducted in August and lasting approximately 60 minutes, included questions focused on goal completion, change in DL integration, change in DLI, and impact of the entire process (e.g., What are your thoughts regarding the amount of DLI change that occurred through this process?). All interviews additionally included questions concerning other aspects of survey completion (e.g., goal setting, and weekly check-ins) to inform both motivations and factors leading to change.

All interviews took place in public locations selected by the participants. These locations included a mix of coffee shops, Learning Academy classrooms, and local restaurants. Interviews were audio-recorded and transcribed into written text for analysis. I stored all data on a cloud-based storage site under the assigned pseudonyms. I removed all identifiable information such as names, school buildings, etc. from the texts and replaced them with pseudonyms for anonymity and confidentiality.

Reflective Artifacts

I additionally asked participants to create reflective artifacts throughout the study duration. Artifacts included weekly check-in forms (Appendix L, M, and N), goal setting sheets (Appendix G), emails, and reflections of weekly professional learning resources. Participants completed all artifact entries electronically. The participants generated the artifact entries and uploaded them directly to the cloud-based storage site. These artifacts were accessible only to myself and the individual participants.

I analyzed reflective artifacts and *DLIS* results (both degree of growth and reflection questions) for themes, using the same analysis as above. I then added these artifacts into each's narrative. Comparison of themes to learning identity growth (i.e., Wilcoxon results) informed learning transfer and amount of change (i.e., if a teachers' *DLIS* pre-post scores show growth in DLI but qualitative analysis lacks change indicators, questions emerge regarding growth not leading to change). Qualitative analysis helped further determine factors possibly leading to change in teachers' DLI and factors motivating teachers to change classroom DL integration.

I created an artifact timeline as I collected artifacts from the teachers and interviewed throughout the study to gather a better understanding of change. I then analyzed coded themes for elements of change related to DL integration within the artifact timeline. Data collection

concluded in August 2018, when participants completed a final *DLIS* administration, a final check-in reflecting on the process, and a final interview.

Reflexive Research Journal

I maintained a reflexive research journal throughout the data collection and analysis process. This journal acted as a data source, as my reflections become a critical component of the storying and re-storying process (Clandinin & Connelly, 2000). The considerations of a researcher largely impact the analysis process; therefore, maintaining a chain of accountability in the reflexive journal aids in determining validity and authenticity of findings.

Data Analysis

Qualitative data analysis "transforms data into findings" (Patton, 2002, p. 432). This process allows me to synthesize the socially constructed data and reconstruct it into meaningful wholes (Lincoln & Guba, 1985). Qualitative analysis aims to consolidate, reduce, and interpret the data meaningfully (Merriam, 2009), beginning with no established theory or hypothesis to sway the researcher's mind (Lincoln & Guba, 1985). However, determined research purpose and questions guide my data analysis (Merriam, 2009). Therefore, I began the analysis with no pre-determined framework to allow the categories to emerge from the data and the participants voices. Such an analysis addressed the research purpose and research questions. Furthermore, realizing I, the researcher, do not enter into this study free of bias, I positioned myself in this study the same as in Chapter III.

I transcribed the interview recordings verbatim to prepare the data for analysis. These transcriptions resulted in a total of 218 pages of transcripts (ranging from 10 to 21 pages; average 14.5 pages). I shared the transcripts with participants after the interviews, conducting member checks, to ensure trustworthiness (Tracy, 2012).

Coding Process

I used the same assigned pseudonyms and coding process from Chapter III as the study participants included a subset of the participants from a subsequent study. Due to the complexity of coaching and its ability to allow for difference and growth in study participants, analyzing themes within the qualitative data did not fully support the teachers' narrative within this study. I needed to conduct a deeper analysis to make meaning and bring life to the participants' narratives. So, instead of solely analyzing themes as a part of the data analysis, I created portraits of each participants' journey from the timeline derived from their artifacts.

While I had already coded the artifacts for previous research, I approached coding of the interview data somewhat similarly. Coding procedures remained the same (two coding cycles, guided by Grounded Theory (Glaser & Strauss, 1967), comprising one cycle of open coding, one cycle of a priori coding, and a final cycle of axial coding followed by thematic analysis). While coding procedures were similar, data analysis differed. Upon completion of the thematic analysis I analyzed my participants individually across time and space looking for patterns of change and discovery. I first analyzed each interview separately and then looked at each participants' interviews holistically, searching for commonalities and indicators of growth and change. I revisited the artifact coding, after analyzing the interviews, to determine connections between the artifacts and the interview data. Lastly, I compiled all data on each participant and analyzed the story the data revealed. This practice of beginning with each piece of data and then broadening the analysis to a more holistic look at all data began the iterative process of portraiture creation.

Storytelling

I introduce all five participants and their DL perspective leading into each participants' portrait through the lens of their three-dimensional space (i.e., sociality, temporality, and place)

(Clandinin & Connelly, 2000). I created each portrait using data collected through interviews and artifact collection, organized sequentially to define the learning process better. See Table 3.4 for additional participant demographic information.

I recognize I approach this study, as a researcher, through my biased lens. My positionality in the study includes that of a teacher with 16 years' experience at both the K-12 and higher education level. I served as a mentor and supervisor of novice and preservice teachers while fulfilling an in-service teachers' role. My experience in teaching, mentoring, and supervising both in-service and preservice teachers demonstrated that many teachers appear ill prepared to incorporate DL into their classroom instruction.

Study Portraits

Learning Academy's Portrait

Learning Academy is a beautiful campus, encompassing 40 acres, filled with trees and outdoor learning spaces. Open iron gates welcomed me to the front of the school where a meticulously landscaped sidewalk directed me into the main entrance of the campus' upper school wing. While not all interviews occurred in the upper school wing, this side of campus serves as the natural entrance point to the school.

As I walked through the front doors, towering high ceilings framed a welcoming woman sitting behind a desk in the front lobby. Student lockers stood unlocked to my left, and a hallway of classrooms opened to my right and straight ahead. Beyond the hallway lies a breezeway connecting the upper school wing to the lower school wing. The lower school wing mirrors the design of the upper school wing. The two wings create perfectly symmetrical educational spaces divided by the impressively bricked breezeway painted with a world map on the concrete floor.

Learning Academy appears more like a community college than a K-12 setting. The campus contains large open spaces for collaborative learning and a plethora of windows letting in natural light to frame the students learning in each classroom. Learning Academy contains additional buildings besides the main building (upper school wing, connecting breezeway, and lower school wing)— a preschool/science wing, cafeteria/fine arts wing, small gym, and a large gym/special events center. Additionally, Learning Academy boasts a football field to hold their six-man football games and two playgrounds.

The atmosphere at Learning Academy appears relaxed, with faculty, staff, and students filling each space with smiles and a sense of learning apparent around almost every square inch of the 40-acre campus. Students at Learning Academy do not take standardized tests and administrators encourage nontraditional methods of teaching and learning.

Erin's Portrait: Take Time to Sharpen the Axe

Erin is a middle and upper school English/Language Arts teacher. She began this study confident in her personal use of DL but continually looking for ways to enhance her professional DL use. She created goals focused on technological efficacy—wanting to increase her confidence in using technology for higher purposes of learning, and technological knowledge achievement—wanting to understand better how technology increases learning. Erin does not think of herself as "someone who's super techy or someone who's super forward thinking" (Erin_I1_021218). Her husband builds computers, and she compares herself to him. She recognizes her curiosity and "always search[es] for different things that work and [she] works with some really awesome people who [progress her] more" (Erin_I1_021218). She recognizes technology's value, emphasizing, "it's only helped us get better. It pushes us. Education is not

moving fast enough, and technology is really pushing us…" (Erin_I1_021218).

Approximately one month into the study, Erin shared:

> I initially did not think that reflecting on how I use technology to learn would be important for making me a better teacher, but you've really shifted my opinion through the resources and activities you've shared. This time to reflect has been essential, and it is amazing to have someone sending you bite-sized, curated resources each week. (Erin_I1_021218)

Erin demonstrated a mindset shift early and maintained this positive mindset throughout the study duration. She remains cautious of the power of technology and its influence, even with the mindset shift. Erin noted:

> …I feel like right now nobody knows what they're doing and adults definitely don't know what they're doing. They're worse than the children. They definitely don't know how to teach their kids about how to use it responsibly and so I'm hoping that it will get a little bit better. (Erin_I1_021218)

Additionally, Erin worries about the stigmas behind the digital native title and worries about her students' exposure to ineffective use of DL. As a 6^{th}-12^{th} grade teacher Erin notices, "Older kids kind of have been guinea pigs through all of this so I think they get frustrated, probably fairly so…" (Erin_I1_021218).

Through coaching Erin received resources geared toward reflecting on her own DLI to strengthen the connections she made. Furthermore, resources helped her continue to see growth through the coaching method. Erin utilized the sent learning resources both in her learning and modified for her students' learning as the study progressed. For example, one week she talked to her students about how they used DL to learn and reflected on similarities and differences she observed between their learning and her own. After talking to her students, she reflected on their comments and how her "highly motivated group of student leaders" experienced mixed feelings based upon the manner each of their individual teachers integrated DL (Erin_R3_030518). Erin

shifted the learning in her classroom after this discussion with her students. She reflected, “I am teaching [my students] how to get what [they] need. I am not going to show [them] where it is, but it gives [them] tickets into these different arenas” (Erin_I2_031818).

Erin took what she learned as the study progressed and shared it with others. She felt others would benefit from the value she associated with the coaching process. In one such instance, Erin explained, “As we come to the end of the trimester, we get really grade focused. We’re talking about, as a [department], how we could use all these digital tools to be more intentional about assessment, reflection, and sharing about our learning” (Erin_C5_022318). Erin maintains a strong support group on her campus and they often share ideas and resources and resources through department shared Google docs.

Erin’s participation never wavered as the semester progressed, but her check-ins reflected the obstacles teachers feel during busier points in the year. In the middle of March Erin checked-in and commented:

> Mine is more of a mindset issue. Rather than taking all these resources and info in stride, I can get easily overwhelmed by all that I’m learning and feel defeated and inadequate. I’ve got to learn that it’s totally fine to let some good ideas pass me by rather than immersing myself in every email someone shares or article I get from Twitter. (Erin_C8_031518)

At the end of April, Erin’s life changed as she gave birth to a baby. This life change reflected in Erin’s artifacts. She participated on her phone instead of her laptop and she used the voice to text option on her phone to record her reflections. Erin reiterated how the traditional PD methods she was accustomed to would never allow continued learning after having her baby. She needed the flexibility and differentiation coaching provides and the time to reflect on her learning. Repeatedly throughout the study Erin reflected on the value of reflection noting:

> …who is it Lincoln that says if I'm going to chop a tree down I'm going to take the first two hours to sharpen the ax. Maybe Lincoln didn't say that but the whole idea of taking time to sharpen the [ax], I feel that is huge in education but I feel that I don't take the time…I need to stop and work smarter not harder so I think it's really good to be made to reflect because I think it makes me stop, take a step back, and look at things differently. It makes me a better teacher…I never thought about my own technology use and was not at all reflective of how I was using technology and I think that needed to happen. I don't know if I am always good about thinking about how I learn. You think it is so obvious but it's really not. (Erin_I2_031818)

Erin took the *DLIS* again at the end of this study and her scores either stayed the same or increased in each subcategory. The goals Erin set for herself at the beginning of the study included raising her technological efficacy score by 1-2 points and her technological knowledge sources by 1-2 points. Erin's *DLIS* scores appeared high at the beginning of the study, even so, she achieved her goals in both areas. When asked about the growth of her *DLIS* scores, Erin shared that the growth happened due to how coaching made her better appreciate the role technology plays in her life both personally and professionally. Furthermore, her scores made her think about her own DL learning and how her learning naturally applies to the way she wants her students to learn. Lastly, Erin requested a continuation of the coaching process as she wants to continue the learning process.

Patrick's Portrait: The Perfect Key to Motivate

Patrick is a long-term substitute teacher with a background unlike most substitute teachers. He reports over 30 years of teaching experience, advancing in his educational career from classroom teacher to administrator to superintendent to retirement and currently back as a substitute teacher. Patrick shares he missed the school environment and students. He plans to apply for a full-time position at Learning Academy for the fall.

Patrick approached this study as a DL novice personally, but adaptive professionally. Upon completion of the *DLIS* survey, Patrick used the results and goal setting resources

(Appendix G & J) to set a goal focused on learning more about using technology to learn challenging materials. Patrick categorizes himself as "still in the learning stages of [digital literacy] but [he] can adapt really well when [he] get[s] into a digital environment…" (Patrick_I1_021218). Currently, Patrick is in his first year of teaching at Learning Academy. Prior teaching experience includes multiple years of middle school science instruction before moving into administrative roles. As most of his classroom experience occurred 20+ years ago, he reports continually working to keep up with methods for incorporating technology in his classroom but sees value in it for both his and his students' learning. Patrick feels he often uses DL to help him further his understanding of a topic he teaches. He shared:

> Today I am teaching a subject I am not familiar with, it is social studies and I am a science teacher, so I went to YouTube and learned about the annexation of Hawaii and Alaska…I went to Quizlet because I've got my students learning WWI and I've got this test coming up so I put some terms into Quizlet that I know are going to help them prepare for the test. I've been to Google Drive and pulled up things for the school…so technology is kind of connecting everything that I have to do today…I'm in a routine right now and if I didn't have that technology, I'd have less information to do the work that I need to do and prepare. (Patrick_I1_021218)

Patrick participated in few check-ins or reflections during the study but sent emails when questions arose, or he sought advice (Appendix T). Patrick proved motivated more by his students' learning than his own and talking about his personal learning often lacked measurable benefit. However, reversing the process, having student learning connect to his personal learning, helped him make connections. As Patrick shared, "The world is open to [students] when they open the computer so it's my job, as a facilitator of instruction, to make sure the world is structured in a way where they get the content…" (Patrick_I1_021218).

Additionally, Patrick often met with colleagues to learn more about how they used DL in their classroom and strived to find ways to integrate those resources in his class. For example,

Patrick shared, “So I asked a teacher… what can I do to bridge that gap between [connection to today’s world] and he said NewsELA and I said tell me more about it…and I could share it with the class and I could share it through email…” (Patrick_I1_021218).

In addition to seeking help from peers, Patrick sees benefit in asking his students to assist him with DL, learning for both his and their success. Patrick realized these interactions build stronger relationships with his students as, “They love it because we are going to get each other through it and we make each other feel safe” (Patrick_I1_021218). Furthermore, building relationships helped Patrick better recognize his students’ needs.

Through multiple levels of support—coaching, peers, and students—Patrick saw growth in his thinking. He commented, “Before the study, I had many of the old paradigms of classroom communication, now I see how digital literacy can enhance communication and can widen the world of student learning” (Patrick_I2_051218). Patrick’s statement further highlights the growth he experienced in his learning and his continued focus on student learning.

As the study ended, Patrick’s post-survey scores demonstrated growth in each subcategory. The goal Patrick set for himself at the beginning of the study included raising his technological knowledge achievement by 1-2 points. Patrick achieved his goal, raising his score by eight points.

Nancy’s Portrait: Go and Do It

Nancy began this study with confidence in her professional DL use but unease about personal DL use and application. In response to her *DLIS* scores, using the goal setting resources (Appendix G & J). Nancy approached goal setting ambitiously. She first chose four areas she wanted to see growth in her DLI but made the final decision to narrow her goal setting to two main objectives; wanting to learn ways to regulate and direct her learning with technology and

wanting to understand better the potential for technology to increase learning. Nancy began the study concerned about her *DLIS* scores and the discrepancies she felt between her scores and herself as a learner. She noted difficulty taking the *DLIS* because she struggled with separating her professional and personal DL use. Nancy explained, "I don't really use [digital literacy] much personally except for like music and email and to check Facebook…I'm not very personally dependent on it" (Nancy_I1_022118). Alternatively, on a professional level, she uses DL "all the time" (Nancy_I1_022118). Nancy incorporates DL into her classroom daily. She learned a great deal about classroom integration of DL from a previous campus and she missed the "very strong IT department and team of strong teachers…who knew a lot of technology" (Nancy_I2_022118).

Additionally, Nancy felt that Learning Academy needed more DL support, and she felt obligated to provide that support but overwhelmed by including support in her perceived role. As she shared, "…there's not anyone I can lean on to learn from, so that's what I was hoping for form this [coaching]…. the conversation isn't happening and so I know so many ways that we can grow because I've seen it. I just can't lead it all the time" (Nancy_I1_022118).

Nancy participated considerably during this study. She routinely completed weekly check-ins and sent emails with resources and ideas she came across (e.g., "I just found the site 'cult of pedagogy' last week when I was looking for persuasive writing stuff… Really liked it!" (Nancy_E9_040918)). She shared resources with others through tweeting out ideas (Nancy_C4_030118) and this interaction inspired her to collaborate more with peers regarding DL. Such collaborations included, "teaming with an old co-worker on Google slides [to work] on a presentation we are giving during Spring Break…in Miami" (Nancy_C5_031818), skyping a teacher in Tennessee (Skype for personal learning was a weekly personal learning focus) to plan

a way for "our students [to] present their Book Clubs to each other" (Nancy_C7_040818), and working to convince the Learning Academy staff "that digital portfolios are awesome, doable, important, and a great way to show student progress" (Nancy_C6_032618). Nancy shared that this confidence came from her participation in the present study as "it's given her more of an accountability…I just need to go and do it…cause the digital world is just so seamless that I don't even notice it. I am trying to be more aware of what I have learned new" (Nancy_I2_051618).

Nancy reflected on her learning after completing the *DLIS* again as the summer ended. Her scores either stayed the same or increased in each subcategory. The goals Nancy set for herself at the beginning of the study included raising her self-regulated learning score by five points and her technological knowledge sources by five points. While Nancy achieved neither goal directly, she showed growth in both areas.

Camille's Portrait: The Journey of Digital Literacy Learning

Camille began this study from her perspective as a relatively strong user of DL. She self-reports using technology "constantly" but, she shares that she doesn't "feel like [she] learned a lot from it other than the random things that [she] Google[s]…" (Camille_I1_020518). *DLIS* results and goal setting resources (Appendix G & J), guided Camille to set study goals focused on increasing her confidence in using technology for higher purposes of learning and increasing her toolbox of technological resources applicable for learning. Camille connected her learning to her students' learning, sharing, "I think it's just trying to find different ways to do things. To reach different kids because they are from this digital world, so we are trying to do things that I never learned to do" (Camille_I1_020518).

Camille felt drawn to the research after receiving personal learning resources based on research on DL learning. After a few weeks, she explained, "I've been doing research and discussing my efforts with colleagues to gain some more ideas on how they have approached digital literacy" (Camille_C4_020918). Camille reflected on a mindset shift in her thinking as a result of the research and other resources:

> I'm thinking about digital literacy differently. I'm realizing that it doesn't come easier to younger generations, and that we all have to work at adapting our learning as technology changes. I think it's making me slow down when I teach others a new technology format or using technology in any way. It's making me more patient with myself and others, yet I feel that I'm finding more success and getting more accomplished. (Camille_C4_020918)

While Camille actively participated in each part of the study, it appeared from her check-ins that she still struggled with her own DLI and wanted to learn more. Camille commented:

> I am learning about the various ways that people learn through digital sources. I've always wanted to learn how to cook 'fancier' meals so I looked this week through those eyes. How can I find information; also, how can I process this new information to gain an effective product in the end? I found a resource on Instagram that led me to a blog. I had to look up some ingredients to find out what they were and then I shopped online to gather my materials. In the end, I produced a new dish that was actually edible! I reflected on the process that I took to learn something new and tried to see how my students could follow similar steps. How can we teach kids to be investigators when they are so used to having information handed to them? (Camille_C6_021518)

Camille focused on her learning first, making connections to her students' learning second which is aligned with the original conception of the coaching model.

In May, Camille became more intentional about the variety of resources she used (e.g., social media sources, peers, coaching, blogs, and printed texts). She also wanted to make more time for her learning (Camille_I2_051818). She felt that previously her "integration of digital literacy was somewhat forced" and she "was trying too hard to make certain new technology fit."

Now she is “looking at all the possible experiences [she] wants to provide for herself and her kids” (Camille_I2_051818).

After a few weeks of time management aspects included in Camille’s personal learning resources, she realized, “Things are always changing. There’s always something new to try. It can be overwhelming, but this process has helped me focus on one at a time. I think I am headed in the right direction of the goals I set in the beginning [of this study]” (Camille_C17_061318). Camille learned in the middle of July that in addition to teaching 4th grade English/Language Arts for the coming school year, her teaching assignment also included 5th grade science. She felt apprehensive about integrating DL into science curriculum as she had never taught science before.

Camille took the *DLIS* again at the end of the study and her scores were higher by four to 17 points in each subcategory. The goals Camille set for herself at the beginning of the study included raising her technological efficacy score by eight points and her sources of technological knowledge by ten points. Camille raised her technological efficacy score by 12 points and her technological knowledge score by 17 points, achieving both goals. For Camille, growth occurred as a result of this coaching experience as it, “[opened her] eyes to all that [her] students need to be prepared for and ways to get them prepared” by helping her “feel more like digital learner, which makes [her] feel more prepared to teach students to be digital learning” (Camille_I3_080718). Camille created a support team, in response to a PD email, but also requested a continuation of the coaching as she “needs the accountability” (Camille_C19_081018).

Jane's Portrait: Food for Thought

Jane uses DL often in her classroom but primarily out of necessity for student preparedness. At the start of the study, Jane used her *DLIS* results and provided goal setting resources (Appendix G & J) to set goals for herself. Jane's goals focused on increasing both her confidence to use technology for higher purposes of learning and her toolbox of technological resources useful for learning.

Early in the study, Jane mentioned:

> I can see A LOT of application of technology related to teaching in the areas of Language Arts and History where social issues and student choice can help students engage and learn. I am still having difficulty seeing how using a workshop model or a Skype interview will help with a math lesson about fractions. (Jane_C1_020518)

As a math and science teacher, Jane needed resources relevant to her, and a broad look at DL could take her focus away from the main objective, digital learning. Additionally, Jane's perception of her digital learning demonstrated signs concurrent with the beginning stages of learning recognition. She felt she never stopped to think about her digital learning, commenting she maintains a position on the learning curve and feels she never becomes an expert as technology is constantly changing (Jane_I1_020818).

Jane struggled to differentiate her personal learning from her students' learning, often seemingly unaware of her repeatedly checking her phone and referencing examples on her computer, confirming she uses DL to learn but lacks recognition of personal use. Jane's comments on her personal learning continued as the study progressed. While she did not always fully internalize sent resources (e.g., "I do feel like the information is interesting, and it is at least giving me food for thought" (Jane_C3_022018)), she continued to find value in the study (e.g.,

"I plan to actually devote some intentional time to reflecting on my own digital literacy…" (Jane C3_022018).

Jane's husband experienced a job transfer in March resulting in her family moving to a different city at the conclusion of the school year. This news caused Jane to focus more on her family's future transition and she became busier than usual. This change in Jane's life demonstrated a more task focused approach to her participation. Thus, she reflected on her digital learning resources on a more frequent occurrence. Her reflections shifted from her personal learning back to student learning a bit more but on a deeper level. Jane believes due to the difficulty of keeping up with the rapid changes resulting from technology, "perhaps going back to a simpler way of life might be better for all of us" (Jane_R5_040218). Jane approached her thinking from a philosophical view when she reflected on her learning (e.g., "… I don't know if/when I will be able to become a learner again in the way I once was...I may have to accept that my preferred mode is just a reality…all the 'distractions' are part of the learning now…" (Jane_R7_050818)).

At the end of May, Jane felt the study positively influenced her learning (Jane_I2_052218) and reported on her students learning with the assistance of DL and how she thought about her learning as she designed lessons for her students. Jane shared:

> Before this study, I mostly relied on my own experience with different technology platforms for learning, whether it be something I found on my own, learned from a peer, or something I learned in professional development training. Since January, I have been more intentional in seeking different ways to integrate technology for a variety of reasons: (1) It is actually easier in any ways to collaborate and communicate with students…, (2) The students like it! They are more engaged!, and (3) It is the way of the present and the future. The more the kids and myself can comfortably integrate technology into our lives, the better prepared we will be at navigating the future. (Jane_I2_052218)

Jane moved into her new house in early June but continued her progress in the study amidst the transition of moving and buying and selling a house. Additionally, she lacked internet access for over a week and that hindered her participation somewhat. She shared she appreciated the flexibility of coaching as flexibility abled her to continue in the learning process (Jane_R11_052818).

Jane took the *DLIS* again at the end of this study and her score reflected growth in each subcategory. The goals Jane set for herself at the beginning of the study included raising her technological efficacy score by two points and her sources of technological knowledge by five points. Jane's technological efficacy score raised by two points and knowledge source score raised by six points, resulting in Jane achieving both of her goals for her DLI growth.

Synthesis

After analyzing my participants individually across time and space in their portraits, I then analyzed them as a group, framed by the three-dimensional elements of narrative inquiry (sociality, temporality, and place). I searched for identifiable commonalities and differences within the data using my original thematic analysis.

I first looked at participants' responses to each research question (i.e., What themes emerged when analyzing all participants' responses to research question #1?) to determine shifts in cognition, factors related to change, and other similarities and differences presented by the interview data. Next, I looked for keywords and phrases cueing me to 3-dimensional elements and then I returned to the artifact timeline for the larger context. Sociality cues included comments participants made regarding their thoughts and reactions to the coaching process, For example, "New ideas to try out because sometimes I need someone to encourage me and remind me to try these things" (Camille_I2_080718). Camille used the words "encourage" and "remind"

which cued me to her thoughts on the coaching process. Temporality cues included comments participants made highlighting the impact of past, present, and future events. For example, "I would love to go back…You gain more confidence but I do not need to know everything" (Erin_I2_031818). Erin's phrasing, focused on past experiences, cued me to aspects of temporality within her narrative. Lasty, I looked for keywords and phrases denoting location when searching for place cues. For example, "I think [Learning Academy] is a unique place and I think there are a lot of really unique conversations happening there and I want to broadcast that out" (Erin_I2_031818). Erin's mention of Learning Academy, as well as reference to a specific place, cued me to search for the context surrounding her statement. The cues related to all 3-dimensional elements allowed me to categorize my participants comments in a manner that more strongly supported the developing narrative.

Lastly, using the categorization of sociality, temporality, and place, the data revealed more noticeable elements. These elements further attributed to recommendations I made for this research. For example, factors related to place constituted a lighter impact on teacher's motivation to change. Thus, results indicate the school where the teachers were teaching, Learning Academy, influenced change less than factors related to sociality and temporality for study participants.

Furthermore, by analyzing interview data through a three-dimensional lens, I evaluated the impact of the current study procedures, coaching procedures, and changes made throughout the study. Such analysis further defined each three-dimensional element. Additionally, analysis brought to the forefront areas of the study and coaching procedures that appeared to increase the impact on teacher's motivation to change. I used identified areas of impact to make recommendations for further coaching leading to teacher change.

This analysis guides my response to research question #1, What are the motivations of teachers towards shifting their DLI as measured by artifact analysis and self-report and research question #2, What are the motivations of teachers to shift cognition and affect regarding elements of DL integration in their classroom as measured by self-report. In the following sections, I synthesize portraiture data through a social, temporal, and place based lens to further develop the narrative surrounding teachers' motivation to change.

Sociality: Participants Thoughts and Reactions to Coaching

Individuals reflect on experiences through thoughts and reactions resulting from those experiences, all through a social lens (Clandinin & Connelly, 2000). For study participants, coaching-based reflections were manifested consistently through the study. Typically, personal learning resources focused on reflection, brought participants thoughts and reactions regarding their DL development to the forefront each week. Intentional time to reflect led to profound discoveries for participants, leading to growth.

One such discovery confirms a need for me to reduce demands (e.g., time) on teachers to increase motivation to participate in the coaching process. For example, I did not want coaching to become an onerous demand on teachers' time, so I strived to maintain a balance between the needs of my participants and the goals of the coaching process. Overall, I noticed student success motivates teachers but if coaching presents a barrier to that success (i.e., having to choose between participating in a coaching activity versus lesson planning), the value of the coaching becomes reduced. It is important to note here that the teachers had no reduction in their workload by agreeing to participate so this PD went above and beyond their typical workload. Teacher portraits provide evidence of value tied to student success and through the coaching process, as I observed tension between time commitments, I shifted the learning resources to be more

conducive to my participants' needs. For example, when participation wavered for some of my participants, I reduced the amount of sent resources for a short period. Additionally, I allowed my participants an option to check in through email instead of using the reflection forms. Reduction in resources and check-in options allowed participants time to catch up or focus on other time demands that were pressing before returning to the coaching process.

Participant reflections after I made modifications to the sent resources and check-ins demonstrated an awareness that coaching methods of PD allow more flexibility and choice in their use of time, helping teachers associate greater value and engagement with the coaching process. For example, Erin reiterated how traditional PD would not allow her to continue learning after having her baby. She needed the flexibility and individualized support that coaching allows (Erin_I3_080718) and the time to reflect on her learning. Additionally, Jane lacked internet access for over a week and that hindered her participation some, but she shared without the individualization of coaching, completion seemed impossible (Jane_R11_052818).

Added value became apparent as teacher reflections focused less on the demands of their time as evidence of success was demonstrated. Teachers initially reported time as one of the biggest obstacles to DL integration, with continually increasing demands on their time and distractions that deter from student learning. The teachers mentioned time less as the study progressed, in both their interviews and artifacts. Additionally, there was an increase in comments related to increased value and relevance (i.e., Andragogy) associated with DL. As explained by Lukacs (2015), when teachers find value and take ownership in DL learning (i.e., Expectancy Value Theory; Wigfield & Eccles, 2000), they may experience a shift in their motivation to change their DL perception, as value guides teacher motivation (Fan, 2011).

Arguably, data collected in this study supports the idea that an increase in the value teachers associate with DL learning motivates them to shift their DLI.

Furthermore, as value increased, participants provided more feedback through artifacts collected (e.g., completed more weekly reflections). More feedback led to more individualized coaching. I received deeper data from my participants which allowed me to provide more individualization in the coaching process. For example, Camille shared in an interview that she wanted to learn more about opportunities for her students to Skype with an author or community member. I sent her resources on authors who would Skype with classrooms for free, methods for conducting successful virtual interviews, and ways to prepare students for have virtual guest speakers. By individualizing the entire coaching process, my teachers reported feeling empowered to make choices regarding their learning. Data from this study adds to research demonstrating coaching acts to alleviate the sense of seclusion and isolation that comes with teaching by encouraging conversation (Alaniz & Wilson, 2015).

Additionally, coaching helps teachers find resources and peers for support. I realized early in the coaching process that my participants wanted to engage in DL discussions with peers. I tasked study participants with finding support for the digital learning in addition to the coaching I provided. All study participants connected to support in some form (e.g., peers, social media, learning communities, and students). Teachers in this study reported that support from me, through coaching, and support from others, motivated them to enhance their DL learning and assess DL learning differently than previously approached.

Lastly, assessment of DL also applies to shifting cognition and affect regarding elements of DL integration in their classroom. More than just evaluating DL tools effectiveness in the classroom, study participants reported a true shift of their cognition and affect regarding DL

integration, as a result of the coaching I provided. As noted by Erin, “I’m empowered to step outside my comfort zone and try new things and utilize new tools and show my kids that vulnerability, that I can try new things and fail and it’s a fine and fun part of learning” (I3_080818). Also, Camille shared, “I think now I experiment with learning in new ways and think about what that process would look like for students. For example, using social media formats…as a learning tool” (I3_080718). Assessing DL, for my participants, came both from my coaching and their own motivations. I individualized the sent resources to assist each participant in assessing their DL first and classroom DL integration second. My assessment resources, as well as participants increased motivation as the study progressed, provided a perceived sense of empowerment regarding DL.

As the study ended, teacher participants noted the change in their perceived ability impacted by the personal learning resources I provided. Participants reflected, “I’m more confident in my identity as a digital learner, and I feel like I have a greater understanding of digital literacy. Now I feel like I have something to share with others on the topic” (Camille_I3_080718), and “It’s changed who I am, so it’s changed who I am as a teacher and how I interact with students” (Erin_I3_080818).

Allowing my participants to reflect on their experiences through thoughts and reactions resulting from those experiences uncovered factors linked to teachers’ motivation to change. Such factors included, reduced demands, reflection opportunities, increased value balanced with teacher need, and shifting cognition and affect of DL learning. Based on the results of this study, future coaching needs to consider the elements of sociality impacting the teachers’ narrative space.

Temporality: Past, Present, and Future Events Shaping Digital Literacy Identity Development

Individuals reflect on experiences based upon association with past instances effecting those experiences, present input adding to the experience, and the potential impact of those experiences on our future, through a temporal lens. The temporality of experiences became evident as study participants reflected on their learning holistically, as opposed to isolated learning events, with the support of the personal learning resources I provided.

The goal of helping teachers recognize how they use DL for higher purposes of learning guided my process for this study. Recognition began by assisting my participants in reflecting on the initial manner in which they were introduced to using DL for learning (past), their current DL competency (present), and the DL needs themselves and their students (future). Each of these stages (past, present, and future) influence a teachers' DLI. Data from this study supports reflections on learning, at all stages, leads to stronger recognition and value associated with DL learning. Namely, as the value of experience increases (i.e., recognizing the impact of past learning experiences), teachers' motivation to shift cognition and affect regarding elements of DL integration in their classroom increases.

As the teachers in the present study strengthened connections between their learning, both past and present, and their students learning (past, present, and future), this transfer of knowledge increased relevance of the coaching process and resources. Strengthened connections came as a result of personal learning questions I sent participants (see Figure 11). This increase caused teachers to better reflect on their motivation to learn, based upon their own experiences. Furthermore, teachers reflected on how their motivations mirrored their students' motivations. For example, Camille commented:

> I am learning about the various ways that people learn through digital sources. I've always wanted to learn how to cook 'fancier' meals so I looked this week through those eyes. How can I find information; also, how can I process this new information to gain an effective product in the end? I found a resource on Instagram that led me to a blog. I had to look up some ingredients to find out what they were and then I shopped online to gather my materials. In the end, I produced a new dish that was actually edible! I reflected on the process that I took to learn something new and tried to see how my students could follow similar steps. How can we teach kids to be investigators when they are so used to having information handed to them? (C6_021518)

Applying her motivations to her students' motivations caused Camille to develop a deeper recognition of motivations leading to change. This reflection and knowledge transfer, aided by coaching procedures I implemented, potentially increased the change occurring in Camille's learning process.

Video: 1. Watch this video of my digital literacy story (https://youtu.be/E4g46b3HtfI). I spent some time reflecting on how I got to where I am using digital literacy to learn and the impact it has had on my path for lifelong learning. It honestly took longer to tell my story than I expected so you may be surprised by your story. 2. Reflect: What is your digital literacy story? How has it impacted your learning?
Figure 11. Personal Learning Reflection Questions

Reflection on learning became a pivotal piece to the coaching model I created for this study. Schon (1987) discusses the importance of reflection in education, noting coaches can inform their mentees regarding a concept they need to know but a coach cannot make mentees understand the concept for themselves. Coaches can rearrange the knowledge to create the right kinds of experiences, but mentees are responsible for a willingness to partake in the created experiences. Reflection, in this study, created the opportunity for mentees to involve themselves in the created experiences and assist mentees in making connections to these experiences.

Using guidelines I established, teachers reflected on their learning through various modes and methods (e.g., activities, videos, research, questions). As evident by the transcription data, opportunities I created for reflection largely impacted DLI growth based upon recognition of DL learning (past, present, and future). Reflection opportunities created a sense of empowerment and, similar to writing to learn research, the practice of reflecting on learning, temporally, led to a greater motivation to participate. Moreover, reflection created increased developments and deeper thinking than simply participating in PD.

Furthermore, as participants used their *DLIS* pre-survey results to guide both their goal setting for the study and to initiate their DLI reflection, survey results impacted teachers' motivation to change. Namely, the way participants used their *DLIS* results informed their story. Participants saw themselves reflected in their *DLIS* survey results and this reflection caused cognitive tension, both positive and negative, that propelled their story forward. Some participants felt their DLIS scores accurately reflected themselves as digital learners and they used the knowledge from the survey results to motivate them to make gains in their DLI. Others perceived their results should be "higher" and demonstrated concerns over what the scores implied about them as a learner. These concerns created negative tension that motivated participants to make gains differently. For example, some participants' frustrations with their scores motivated them to work harder to receive scores more indicative of their perceived DLI while others were motivated to learn more to obtain higher scores.

Results of this study indicate, for these participants, recognition of DL learning and reflection on DLI increases the value participants associate with DL learning. As such, an element of DLI reflection needs to guide coaching procedures aimed to increase teachers'

recognition of their DL learning. Such reflection, leading to greater recognition, impact teachers' motivation to change.

Place: Within a School Setting

An independent school setting lends itself to self-reflection and assessment of teaching as administrators often build time into the year to focus on teaching without the added pressure of standardized testing and required learning standards. Learning Academy has an independent school culture which enhances the rigor of learning, and the high standards set by administrators appears to support DL development. These factors create an environment conducive for teacher self-regulated learning and development.

Such an environment appears to lend itself to enhanced DL learning, but study data does not indicate place having substantial impact on DLI change. Study data lacked connections to Learning Academy and its impact on teachers' DLI. While some participants mentioned the culture of Learning Academy, little reflection exhibited the influence on Learning Academy on teacher learning. Most commonly, participants reflected on the impact of Learning Academy on student learning. Possible explanations for the lacking impact of place in this study stems from study participants primarily being veterans of Learning Academy. As such, they potentially do not realize the impact of the Learning Academy environment on their DLI growth. Perhaps it simply does not present additional obstacles rather than actively facilitating teacher growth. Conversely, the school environment possibly does not impact DLI change in this study. Future research on additional campuses, both private and public, will help recognize the impact of place on teachers' DLI change.

Furthermore, I designed this study for participants to remain anonymous. Participants

lacked opportunities to collaborate or discuss resources they received. Anonymity may have influenced the impact of place in this study as well. Some participants shared they would benefit from resources on campus. For example, Nancy felt Learning Academy needed more support. She felt obligated to provide support and overwhelmed at the responsibility. As she shared:

> …there's not anyone I can lean on to learn from, so that's what I was hoping for form this [coaching]…. the conversation isn't happening and so I know so many ways that we can grow because I've seen it. I just can't lead it all the time. (Nancy_I1_022118)

Additionally, establishing a learning community at Learning Academy potentially could increase not only coaching participation but also implementation of provided resources. By creating opportunities for collaboration, place might impact change resulting from the interactions occurring within the school environment.

Limitations and Future Research

While the results of this study largely support coaching to enhance teachers' DLI and effect change, limitations remain. While overall teachers actively participated in the study protocol, rate of participation varied. I built elements of flexibility and support into the study realizing the demands on teachers' time and their priorities based around student learning. I cannot account for teachers use of time and I did not want the teachers to feel study elements were required. Requirements negate one of my initial purposes in coaching, conducting PD from the perspective of assisting capable, not deficient teachers. I understand and value the way schools and teachers function and did not want to change that within the confines of this study.

Additionally, I set out to tell the story of a coaching-based PD model, not control the story. Such evidence confirms that a coaching model better fits the needs of teachers, over a traditional PD model, due to increased flexibility and individualized support. A coaching model

honors teachers, their experiences, and the complex domain of teaching.

Furthermore, due to the anonymity of this study, participants lacked opportunities to collaborate. Future researchers should provide opportunities for participants to discuss the provided resources with one another. One such opportunity exists through designated learning communities.

Moreover, participants volunteered for this study, creating a group of participants with similar attitudes as all participants perceived some value in DL use prior to the start of the study (see Ch. III). Thus, researchers should collect similar data from a more diverse sample —in attitude and demographics— before making generalizations regarding teachers' digital learning needs. Additionally, collecting data from a larger population leads to a stronger understanding, guiding further statistical analysis. Future researchers should recruit a more diverse participant group to provide varied DL perspectives to guide the coaching development.

Lastly, some study participants demonstrated greater responsiveness at the beginning of the study before the semester demands became great. As the study continued, participants tried to maintain their previous level of participation but faced difficulty finding time for the second and third interviews. As such, the interview duration shortened, and some participants seemed rushed. Future research should consider demands on teachers' time and find additional sources of data to supplement interviews, (i.e., classroom observations and lesson plans).

Conclusion

Value increases an individual's motivation (Fan, 2011). Specifically, if teachers find value in their DL learning, along with a sense of ownership and empowerment (Lukacs, 2015), their motivation to change their DL perspective may increase. Teachers in this study taught me that recognition of their DLI impacts their learning but recognition is insufficient. Teacher must

also increase the value they associate with their DLI. Namely, as participants recognized the impact DLI recognition has on their learning, they began to value the impact their DLI can have on themselves and others. They demonstrated a larger sense of pride in the identity they associate with their digital learning and growth. One way to increase value occurs through a coaching model of PD designed to integrate reflection and teachers' experiences to enhance DL learning.

The purpose of this study was to recognize teacher motivations to shift their DLI, as well as cognition and affect regarding elements of DL integration in their classroom. Such recognition stems from realizing an increase in DL integration primarily comes from teacher change, leading to classroom change. Teachers in this study taught me that reflecting on their DL use, through coaching resources I provided, caused their motivation to shift and their DLI to increase. Additionally, using coaching to increase the value teachers associate with DL strengthens their motivation to increase their and their students DLI becomes. Regarding classroom change, in addition to using coaching to increase DL value, my participants taught me that creating a coaching model that reduces the demands on teachers' time and focuses on DL assessment, instead of DL tool usage, assists teachers in feeling more competent and better prepared to integrate DL into their classroom.

Lastly, my teachers taught me that they want to be treated like an adult when participating in PD methods. They showed me the impact of treating teachers with respect, giving them choice in their learning. Furthermore, they demonstrated the impact of designing a flexible coaching model that values teachers' background and experience as important parts of learning.

Together, these findings related to both teacher and student learning suggest teachers' motivations to change primarily link to the value they associate with a concept. Through

coaching, I learned the value of DL increases based upon teachers' needs, their background, their experiences, and the value they associate with DL. As such, coaching provides an effective method for helping teachers make decisions regarding elements of DL best suited for their learning and their students' achievement.

CHAPTER V

CONCLUSION

We credit Aristotle with the idea that "the whole is greater than the sum of its parts." In education, this reference is relevant as the learning that occurs—the whole education—must be greater than the sum of all the parts that constitute learning (i.e., literacy, teacher knowledge, student motivation, etc.). In today's world, being digitally literate is necessary for both teachers and students (Jolls, 2015) and largely impacts learning. Much effort goes into enhancing students' DL use, but little research or education focuses on teachers' DL use and efficacy (Hall et al., 2014). To enhance teachers' DL competency, leading to increased student achievement, teachers and researchers must find ways to recognize their individual DL learning proficiency, impacting the whole education.

Many educators consider DL a pivotal aspect of a high-quality education (Ertmer, 2005), therefore, undervaluing DL is likely not the main obstacle. With this recognition, what then hinders an upsurge in classroom DL integration? The United States Department of Education's (2017) emphasis may provide some insight:

> Although educators should not be expected to know everything there is to know in their disciplines, they should be expected to model how to leverage available tools to engage content with curiosity and a mindset bend on problem solving and how to be co-creators of knowledge. In short, teachers should be the students they hope to inspire in their classrooms. (p. 36)

Co-creating DL falls within the confines of disciplinary knowledge, as explained by The United States Department of Education (2017). Recognizing teachers will never grow up with the same

DL resources as their students (Schneider, 2015), keeping up with DL tools and techniques for learning is difficult. Instead, teachers should engage in lifelong learning, "with a curiosity and mindset bent on problem solving" and creating knowledge to potentially spur the needed upsurge in DL integration. Such a distinction sets DL apart from many other areas of curriculum. For example, the knowledge base and skills needed to learn and teach content areas such as Algebra or Geography, or skill sets, such as Written Expression, evolve at a much slower pace.

Digital literacy researchers also demonstrate that DL differs from other classroom content or discipline as DL can be integrated into all disciplines (Gormley & McDermott, 2014; Hutchison & Colwell, 2014; Jacobs, 2013). Unfortunately, in most classrooms integrating DL occurs more as an instructional method (i.e., learning how to use a DL tool) instead of a way of learning (Alaniz & Wilson, 2015; Pacansky-Brock, 2017; Underwood et al., 2013). Additionally, many teachers report incorporating only minimal DL in their lessons (Gray et al., 2010). Therefore, if we hope to prepare students to meet the demands of the 21st century workforce, we must develop methods for increasing DL integration in today's classrooms. The traditional methods of preparing pre-service teachers may not align with the dynamic realities of DL – mindsets, rather than skillsets, may be more critical.

This dissertation sought to address three major problems facing DL integration in K-12 classrooms. First, without a measure able to produce reliable and valid estimates of teachers' DL use, it is impossible to determine the impact of teachers' personal DL use on classroom instruction. Secondly, researchers and teachers need to be able to quantify the impact of professional development (PD) on DL integration through methods outside of traditional PD (i.e., coaching) to both monitor the impact of coaching interventions as well as provide individualized feedback to support growth (i.e., providing feedback through the coaching process

to ensure teachers' needs are met). Finally, the field requires a stronger understanding of teachers' motivation to change, specifically linked to DL integration through coaching methods. By developing the *Digital Learning Identity Survey* (*DLIS*) and a coaching model of DL based PD, I have begun to address these issues. Furthermore, the methods proposed in Chapter III and further defined in Chapter IV suggest a coaching model of PD can help teachers better recognize their own digital learning identity (DLI) and work to increase their DL learning, as well as classroom DL integration, possibly leading to enhanced student achievement.

Considered in concert, the conclusions derived from the three studies comprising this dissertation reveal three themes, which I will describe in the remainder of this chapter. First, these studies demonstrate that by helping teachers recognize their own DLI, we can increase their DL use. Increasing DL use moves teachers from solely focusing on their students' DL use to their own use, leading to greater intentionality in classroom DL integration (Teo, 2009; The United States Department of Education, 2017). Secondly, while multiple definitions of DL exist (Hillman & Marshall, 2009; Kivunja, 2014; Nichols, 2012; Pacansky-Brock, 2017; Spires et al., 2012; Zhong, 2011) supporting teachers' ability to recognize the ways they can use DL for learning instead of learning to use DL tools may help further develop their DLI. Such recognition is best suited for coaching-based PD. Finally, the literacy research field requires both measures and methods for integrating DL in classrooms.

Teacher Digital Literacy Use Versus Student Digital Literacy Use

The word *literacy* has come to take on increasingly multiple meanings in recent years — the ability to read, write, and communicate; being knowledgeable about a topic or subject; and conveying meaning with and constructing meaning of a concept. DL, therefore, describes an individual's ability to read, write, and communicate using technology (the fundamental

definition; Connors & Sullivan, 2012), being knowledgeable about using technology for literacy purposes (the derived definition; NCTE, 2013), and producing and consuming information digitally (the actionable definition; Hutchison & Colwell, 2014) all with an emphasis on using technology critically, wisely, and meaningfully (Kipunji, 2014; Ladbrook & Probert, 2011; Lei, 2009; Maderick et al., 2016; Zhang et al., 2016) Too often, these definitions have been conceptualized for student use but little attention has been placed on teachers' DL use (Hall et al., 2014). I argue, however, that focus on teacher and student DL use need not be an either/or approach for researchers, as supporting teachers' fundamental ability to read, write, and communicate digitally helps them recognize their DL use, leading to enhanced students' DL use.

Teachers' DL recognition holds great potential to enhance both student and teacher learning at the fundamental, derived, and actionable levels of DL. Effective enhanced learning only comes if both teachers and students choose to engage in DL learning. Recognizing teachers' DLI, leading to a better understanding of why teachers choose to or not to engage in DL learning constitutes the first step in enhanced student DL learning (i.e., Learning Identity; Gee, 2017). By determining influences and barriers facing teachers' engagement in fundamental DL and enhancing teachers' DLI, increased student achievement is possible.

Distinctions and Recognition of Personal Versus Professional Digital Literacy Use

The first step in differentiating teachers' DL use from students' DL use requires a recognition of the difference between teachers' personal and professional DL learning. Recognition of learning types is important as teachers do not often separate their own learning from the learning practices they engage in to enhance their professional learning (i.e., teacher education). For teachers to better recognize the impact of DL for learning purposes, they must recognize how they themselves learn and transfer this knowledge to learning practices of others.

For example, similar to teaching any other discipline (e.g., science, math, history), when teachers understand the how and why of what they teach, they are more confident in teaching the content (Shanahan & Shanahan, 2008). Contextually, when teachers understand how they use DL to learn, they are more able to teach students how to learn using DL, increasing theirs and their students' DL competencies.

Teachers' professional learning often directly links to student learning and achievement, with minimal reflection on how teachers learn. Such recognition of learning began with teachers completing the *DLIS*, reflecting on their personal DL use, resulting from professional DL use (i.e., information they learned directly linked to student achievement). As reported by participants, most (N=10) had never taken the time to separate their personal learning from professional learning and often found it difficult to separate the two learning types. Reflecting on their personal learning impacted teachers' DL growth as reflective reasoning—making routine action intentional (Alaniz & Wilson, 2015)—helps teachers recognize learning successes, failures, improvements, connections, extensions, and value. Such recognition began in Chapter II, with completion of the *DLIS,* and extended to Chapters III and IV as teachers reflected on their personal DL use and DLI enhancement.

The second step in differentiating teachers' DL use from students' DL use requires recognition of teachers' DLI, as well as their learning goals and needs for coaching implementation. Knowledge from Chapter III relates to II and IV as I based personal learning resources provided in Chapter III on *DLIS* scores from Chapter II and followed up on the effectiveness of both the *DLIS* scores and the sent resources in Chapter IV. As Chapter II informed Chapter III and Chapter III was modified and supported by Chapter IV, this process strengthened the coaching model and provided necessary input throughout the entire coaching

experience. For example, through both email communication and in her first check-in, Nancy shared, “I feel like my survey [Chapter II] really impacted the way I’ve received guidance. I’m not sure if this is personalized the right way for me. I am looking forward to our meeting [Chapter IV], so I can show you where I am coming from and you can help guide me in my growth” (Nancy_C1_020418) [artifact from Chapter III]. The timing of our first interview proved ideal as I worried I would lose Nancy and I needed to understand her thoughts and needs for this coaching better to benefit her.

During our first interview, Nancy divulged her difficulty in taking the *DLIS* because she struggled with separating her professional and personal technology use. Nancy explained, “I don’t really use [digital literacy] much personally except for like music and email and to check Facebook…I’m not very personally dependent on it” (Nancy_I1_022118). Alternatively, on a professional level, she uses digital literacy “all the time” (Nancy_I1_022118). Through our first interview discussion, I learned Nancy incorporates DL into her classroom every day. She learned a great deal about classroom DL integration from a previous campus and she missed the “very strong IT department and team of strong teachers…who knew a lot of technology” (Nancy_I2_022118). She hoped I would become her IT support. I shared with her that I would give her any resources and ideas I could, reiterating the purpose of the coaching was to help her recognize and develop her own DLI. I also shared that I feel by helping her recognize her DLI, some elements she felt were absent in her current school would enhance. After our meeting, I felt better prepared to coach Nancy, and she became more hopeful about the process. As she shared in her next check-in, “On a high all weekend! [I] had my meeting with Wendi Zimmer” (Nancy_C3_022518).

Additionally, final interviews (Chapter IV) provided further guidance for continued coaching resources and procedures (Chapter III). Communicating with teachers to gather input on their coaching needs, motivations, and reflections proved pivotal for this research as almost all participants (N=9) showed growth in their DLI, demonstrated through their *DLIS* scores. Without this level of communication, the individualized support would be more difficult to provide and possibly less effective because I would have based the resources I provided on my own experiences, backgrounds, and biased lens, instead of my participants. Therefore, we must measure teachers' DLI to provide effective coaching resources, as well as monitor growth in teachers' DLI as we bear the responsibility for helping teachers translate their personal learning to success.

What This Means for Students

The third step in differentiating teachers' DL use from students' DL use requires an emphasis placed on reflecting to strengthen DL learning. Chapter III results indicate reflecting on both teacher and student DL use leads to improved classroom integration. For example, during one coaching assignment, I asked Erin to discuss with her students their methods for using DL to learn, reflecting on similarities and differences she saw between their learning and her own. After talking to her students, she reflected on their comments by subject area and how her "highly motivated group of student leaders" had mixed feelings based upon the way digital literacy was integrated into each classroom (Erin_R3_030518). Interview data in Chapter IV supports this result as after this discussion with her students, Erin reported she was shifting the learning in her classroom. She reflected, "I am teaching [my students] how to get what [they] need. I am not going to show [them] where it is, but it gives [them] tickets into these different arenas" (Erin_I2_031818). Additionally, after asking her to reflect on how she uses Skype for

her own learning purposes, through a weekly check-in, Erin commented, “Also, I want to start looking for ways to connect kids to better resources through Skype” (Erin_C1_020118).

Furthermore, when teachers reflect on their own DL learning, connections are made to student DL learning. Such reflection proved pivotal for this study since "transferring digital capabilities from one environment to another - from social life to learning for example - is more problematic for learners than has been acknowledged" (Littlejohn et al., 2012, p. 550). In Chapter III, teachers commented on mindset shifts they experienced, making connections to student learning based upon new realizations in their learning. These comments made in Chapter III were supported and enhanced through interview data in Chapter IV. For example, in Chapter III, Camille reflected:

> I’m thinking about digital literacy differently. I’m realizing that it doesn’t come easier to younger generations, and that we all have to work at adapting our learning as technology changes. I think it’s making me slow down when I teach others a new technology format or using technology in any way. It’s making me more patient with myself and others, yet I feel that I’m finding more success and getting more accomplished. (Camille_C4_020918)

Interview data in Chapter IV extended Camille’s reflection as she noted, “I was thinking when I was typing it like no, I don’t’ think I really know how I learn from technology…it made me really think about what we’re using technology for and what are we teaching our kids to use technology for” (Camille_I1_020518). Extending the reflection on digital learning, Camille connected her learning to her students’ learning. She shared, “I think it’s just trying to find different ways to do things. To reach different kids because they are from this digital world, so we are trying to do things that I never learned to do” (Camille_I1_020518).

The final step in differentiating teachers’ DL use from students’ DL use requires helping teachers recognize links between their DLI and student DL use. In Chapter IV, feedback I

received regarding the influence teachers' perceived ability and identities have on DL learning supports this dissertation. Founded in determining if teachers are able to recognize how they use DL for learning purposes, DL learning will become part of their identity, and this identity will transfer to their classroom instruction through an increase in DL integration. Specifically, recognizing teachers' personal DL use would break down barriers as change in perception leads to change in behavior only if DL value changes (Expectancy-Value Theory; Wigfield & Eccles, 2000). Thus, increasing teachers' DLI increases the quality and quantity of DL integration into classroom instruction.

What This Means for Sustainable Change

At the end of the study, participants noted the change in their perceived ability impacted by the provided professional learning resources. Participants commented, "I'm more confident in my identity as a digital learner, and I feel like I have a greater understanding of digital literacy. Now I feel like I have something to share with others on the topic" (Camille_I3_08072018), and "It's changed who I am, so it's changed who I am as a teacher and how I interact with students" (Erin_I3_08082018). Such transformations explain further the impact of coaching-based PD and possibility for change as at various points throughout the study teachers experienced changes to their DLI. For example, in our second interview, Jane shared:

> Before this study, I mostly relied on my own experience with different technology platforms for learning, whether it be something I found on my own, learned from a peer, or something I learned in professional development training. Since January, I have been more intentional in seeking different ways to integrate technology for a variety of reasons: (1) It is actually easier in any ways to collaborate and communicate with students…, (2) The students like it! They are more engaged!, and (3) It is the way of the present and the future. The more the kids and myself can comfortably integrate technology into our lives, the better prepared we will be at navigating the future. (Jane_I2_052218)

Furthermore, participants mindset shift strengthened their perceptions of themselves as learners and facilitators of learning. As explained by Patrick, "Before the study, I had many of the old paradigms of classroom communication. Now I see how digital literacy can enhance communication and can widen the world of student learning" (Patrick_I2_051218).

Participants' mindset shifts were recorded and analyzed using an artifact timeline. Creating an artifact timeline allowed me to examine change over time, overlaid with sent personal learning resources. Interviews from Chapter IV supported evidence I observed in artifact collection from Chapter III. While artifact data showed growth, as demonstrated by the Digital Learning Integration Matrix, interviews better explained the growth and impact of coaching-based PD. For future studies, lesson plan and observation data would further help determine the impact of coaching on classroom integration, strengthening the self-report data obtained in Chapters III and IV. Researchers should take care when conducting observations as an increase in perceived accountability could decrease some benefits of the low stakes coaching design (i.e., flexibility, empowerment).

Digital Literacy Use for Learning Versus Learning to Use Digital Literacy Tools

In the previous section I focused on how teachers' DL impacted their classroom instruction. Now I transition to how increased DL may impact learning in content areas. Specifically, such instruction should focus on using DL for learning, rather than the integration of DL for the sake of learning to use such tools.

Over the past 20 years, student reading achievement scores show patterns of remaining relatively stagnant or declining (McFarland et al., 2017), as evident through assessment scores and teacher input. National Reading Performance scores showing scale score results from 1992 through 2015 report students in 4th, 8th, and 12th grade showed minimal to no growth, with scores

declining as the students promoted grade levels. Digital literacies (DL) may provide an avenue to engage modern students in reading and thereby enhance learning achievement and decreasing gaps.

Lacking reading progress presents a need for a better understanding of underlying causes of achievement. Research shows the current student generation learns differently, finding motivation and engagement through different outlets. Often referred to as "digital natives," (Prensky, 2001) students use multimodal approaches to learn. National 2015 data specifies 71% of students age three to 18 use the internet (McFarland et al., 2017). Teachers must find ways to reach students and enhance their in-school learning modalities, making them more in line with their out-of-school learning modalities (i.e., digital literacy). The gap between school and home literacy continues to widen, not narrow, over time. Unfortunately, without proper PD, teachers often take control of the technology, not allowing students to engage and find meaning by using the tools themselves (Dietrich & Balli, 2014). Proper PD, for the purpose of this dissertation, came from a coaching model of PD.

Most DL currently being integrated in K-12 classrooms includes activities for engaging students during extra time, as a reward (Turbill & Murray, 2006). For example, students use apps to draw or color pictures. Additionally, teachers use DL as a means of replicating traditional teaching methods in a digital format—tasks essentially requiring students to consume information or learn DL tools. For example, students create digital posters, spending more time learning to use the poster platform than the concept they are presenting. This manner of learning to use DL based tools is insufficient for preparing students to participate in a digital society (Alaniz & Wilson, 2015; Hillman & Marshall, 2009). We need to encourage DL use for learning versus learning to use DL tools. With the rate at which DL based tools are created and modified,

tool knowledge becomes obsolete before it is mastered. Therefore, as educators and researchers we must create environments where learners can use DL tools for learning purposes (i.e., production) versus learning to use DL tools (i.e., consumption). Such environments would shift the current practice of integrating DL as more of an instruction method (i.e., learning to use a DL tool) not a learning method (i.e., using DL tools for learning) (Alaniz & Wilson, 2015; Pacansky-Brock, 2017; Underwood et al., 2013).

For students to become skilled DL learners, they must be given opportunities to use DL tools for production and be exposed to DL learning methods. A PD based coaching method, aimed at increasing teachers' DLI, provides support for teachers in using DL tools for production. Such support creates potential opportunities for teachers to transfer the understanding of their DL use for production to student DL use, thus improving the quantity and quality of classroom DL integration. Furthermore, the coaching model created for this research offers a resource for teachers (who may not have received any education in DL) to reflect on their learning to better recognize their students' DL learning. This support will help both teachers and students engage in digital learning, a key component of DL (Hall et al., 2014), and promote DL use for learning.

Realizing that consumption type use of DL tools appeared frequently in both artifact collection in Chapter III and interview data in Chapter IV, I tried early on to provide support in shifting participants thinking from a consumption to production method of DL integration. While I never asked participants about specific DL tools they used for learning, various DL tools came up in study artifacts. Artifact analysis in Chapter III demonstrated 20% of the data focused primarily on specific DL tools used for both personal and student learning. For example, Patrick shared, "Finding different strategic ways of holding students accountable for literacy learning

during independent learning activities. I want to continue learning more in-depth, google classroom and hyperdocs" (Patrick_C1_040518). Additionally, Nancy commented, "The day goes by, I have all intentions to tweet out, but then if I don't do it that day it feels meaningless. Kind of silly to think that 1 day is too late already…we are living in a time of instant gratification." (Nancy_C4_031818). Multiple other artifacts named specific DL tools such as, Google docs, NewsELA, Hyperdocs, WebQuest, YouTube, etc. Interview data from Chapter IV further supported artifact themes as 100% of participants referenced learning to use DL tools and few participants (N=2) commented on using DL tools for learning purposes.

Data collected in both Chapters III and IV assisted me in shifting provided personal learning resources to focus on the difference between learning to use DL tools and using DL tools for learning purposes. As a result of modified personal learning resources, I observed a shift in teachers' thinking regarding DL tools. For example, early into the study Patrick realized, "All of these [tools] that I'm teaching them they've been taught by other teachers…They help me through it…So really I'm the one that's the learner…" (Patrick_I1_021218). As the study progressed and Patrick approached DL tools from a different perspective, Patrick noted;

> Two things have emerged: 1) If you do not take the time of becoming uncomfortable within a new learning process, you cannot master it. When we get frustrated, we need to realize that the normal process involves this frustration; therefore, breathe and continue to plow through until masters, 2) I still need to find different strategic ways of holding students accountable for literacy learning during independent learning activities. (Patrick_C1_040518)

The intervention results described in Chapter III demonstrates empowering coaching methods can help teachers engage in DL use for learning, not learning to use DL tools. The participants in this study showed an average Cohen's *d* effect size of 0.26 in DLI across pre and post *DLIS* scores, with *Self-Regulated Learning* (*d*=0.39) and *Knowledge Sources* (*d*=0.48)

presenting the largest effect size calculations. This average score reflects a small growth in teachers' DLI as measured by the elements identified in the *DLIS*, and mirrors the PD delivered in this coaching model as participants set more goals focused toward *Knowledge Sources* and all professional learning resources highlighted aspects of *Self-Regulated Learning* as an element of Andragogy (Knowles, 1978). I did not attempt to address all identified DLI areas, so it is reasonable that not all DLI areas demonstrated similar growth. In essence, teachers were better able to use the knowledge presented through coaching to enhance their DLI, which is the foundation of DL use.

Measures and Methods for Digital Literacy Integration

As demonstrated by Alaniz & Wilson (2015) and Hillman & Marshall (2009), DL is no longer a novelty, but a necessity. However, researchers tend to focus primarily on tools used for implementing DL and DL instruction methods (e.g., Cheung & Slavin, 2013; Hutchison, 2014; Ng, 2012). Comparatively, little research analyzes the impact teachers have on students' DL learning. Artifact analysis in Chapters III and IV indicates many unique teacher-related-variables influence the effectiveness of classroom DL integration. Such variables include: perceived identity, experiential influences, DL support, and teaching application connected to student learning.

Additionally, the literacy research field requires validated measures and construct agreement for DLI. The lack of standardization impedes research progress. Many published studies focus on students' DL use and when assessing teachers, research is primarily approached from the perspective of only a teaching role and not of a learner of DL as well (e.g., Flewitt et al., 2015; Hutchison & Woodward, 2014; Kalman & Guerrero, 2013; Schneider, 2015). The *Digital Learning Identity Survey* (*DLIS*) helps to alleviate this challenge by providing a tool

useful for assessing teachers from different populations, backgrounds, experiences, grade levels, and subject areas. Such assessment quantifies technology use for higher learning purposes as all these experiences link to factors impacting a teacher's identity. If we want to invest and support teachers, we need to meet them where they are. As explained by Dewey's (1938) Theory of Experience, a connection exists between experience and education with the effect of the experience and how the experience influences future experiences being most impactful. For teachers, their background, experience, grade level, subject area, and many other factors influence their current teaching and learning practices.

Furthermore, methods for enhancing teachers' confidence with DL (i.e., their digital learning identity) are rare. A DL based coaching model has the potential to integrate authentic DL learning methods into all schools. However, the transformative nature of this approach requires teacher commitment. Coaching based PD is most effective when participants demonstrate a willingness to learn and a teachable spirit (Alaniz & Wilson, 2015). Forcing teachers to participate violates tenets of adult learning and will most likely not produce desired results. As demonstrated in Chapter III, using guided reflection, teachers reflected on their learning through various modes and methods. Sometimes activities leading to reflection were obvious while other times masked by additional objectives to an activity or resource, such as having participants use Bloom's Digital Taxonomy to create their own learning objectives based upon one of the learning goals they set for the study. As evident by the interview transcription data collected for this study (Chapter IV), opportunities for reflecting largely impacted DLI growth. In other words, it was not the activities as much as the reflection spurred by the activities. Reflection created a sense of empowerment and, similar to writing to learn research,

the practice of reflecting on learning led to greater motivation to participate, as well as stronger developments and deeper thinking.

Implementing coaching-based PD for DL support can support teachers' fundamental DL, as demonstrated by the findings of Chapters III and IV. All teacher *DLIS* scores improved in at least one measured area, with some teachers' scores raising by over ten points in measured DL aspects. However, the most encouraging aspect of these findings is while the teachers demonstrated growth in the areas psychometrically validated through *DLIS* development (Chapter II), no matter which area the teachers identified and created goals for, coaching helped them meet their designated goals when they participate in at least 25% of the coaching. This finding indicates any determined element of DLI can increase when teachers recognize they need to grow in identified areas, set goals for achievement, and devote minimal time to achieving their set goal. Future research must examine whether this apparent effect on teachers' fundamental DL will extend to classroom DL integration before generalized claims can be made. However, there is reason to believe helping teachers recognize their DLI, combined with coaching to increase their DLI, will result in increased quantity and quality of classroom DL integration.

Furthermore, the coaching provided in this study demonstrated an increase in the value teachers associate with their DL learning. Added value became apparent as teachers focused less on barriers due to time constraints (i.e., schedule changes, illness) and reflected more on their learning. This shift occurred due to an increase in success demonstrated in both their learning and their students' learning, as evident by data collected in Chapters III and IV. For example, teachers initially reported time as one of the biggest obstacles to integrating DL (Chapter III), with continually increasing demands on their time and distractions deterring from student learning. As the study progressed, the teachers mentioned time less in their interviews and

artifacts with more comments related to increased value associated with DL. As explained by Lukacs (2015), when teachers find value and take ownership in DL (i.e., Expectancy Value Theory; Wigfield & Eccles, 2000), they may be motivated to change their DL perception as teachers are motivated by what they value (Fan, 2011). Arguably, data collected in this study supports the idea that teachers are motivated to shift their DLI if they experience an increase in the value they associate with DL learning.

Additionally, as time remains a factor in any form of PD, administrators must create opportunities for teachers to participate in the provided coaching to optimize results. Until stakeholders (i.e., administrators, policy makers, PD facilitators) make an effort to change the often-ineffective PD delivered in K-12 schools, teachers will remain conflicted between spending their time focused on their students' learning and enhancing their own learning. As Chapters III and IV confirm, a need remains to reduce the demands on teachers, and being mindful that coaching does not become an onerous demand on teachers' time, for them to be motivated to participate in the coaching process. A balance needs to exist between the coaching client's needs and the goals of the coaching process. Student success motivates teachers but if coaching presents a barrier to that success, it reduces the value of the coaching, as evident in the teacher portraits (Chapter IV). While not new information, participant reflections demonstrated an awareness that coaching PD methods incur less strain on teachers' time, helping them associate greater value and engagement with the coaching process. For example, Erin reiterated how traditional PD would never have allowed her to continue learning after having her baby. She needed the flexibility and individualized support coaching allows (Erin_I3_080718) and the time to reflect on her learning. Additionally, Jane did not have internet access for over a week which

hindered her participation some, but she shared she appreciated the flexibility of coaching because she would not have been able to keep up at all without it (Jane_R11_052818).

Value also increased through the coaching model's individualized nature. As the coaching progressed, participants provided more feedback through artifacts collected based upon resources they received directly related to their needs. More feedback led to more individualized coaching. By individualizing the entire coaching process, the participating teachers reported feeling empowered to make choices regarding their learning and felt I answered their questions in a friendly manner with guidance not judgement or feelings of inadequacy. Data from this study adds to research demonstrating coaching acts to alleviate the seclusion and isolation that comes with teaching by encouraging conversation (Alaniz & Wilson, 2015) and helping the coaching clients find resources and peers for support. Teachers in this study reported support from me, through coaching, and support from peers, motivated them to enhance their DL learning and assess DL learning differently than they had previously.

DL assessment also applies to shifting cognition and affect regarding integrating DL in the classroom. More than just evaluating DL tools effectiveness in the classroom, study participants reported a true shift in their cognition and affect regarding DL integration. As noted by Erin, "I'm empowered to step outside my comfort zone and try new things and utilize new tools and show my kids that vulnerability, that I can try new things and fail and it's a fine and fun part of learning" (I3_08082018). Also, as noted by Camille, "I think now I experiment with learning in new ways and think about what that process would look like for students. For example, using social media formats…as a learning tool" (I3_08072018).

Therefore, this study developed an effective and feasible coaching model applicable for implementation in all teacher education aspects, with increased effectiveness in areas where

teachers perceive coaching as a piece of available PD, not an additional requirement or education aspect. As noted by Camille regarding the growth of her *DLIS* scores, "[this study opened] my eyes to all that my students need to be prepared for and ways to get them prepared you helped me feel more like a digital learner which makes me feel more prepared to teach students to be digital learning" (Camille_I3_08072018).

Lastly, I designed this research for participants to remain anonymous. As such, teachers had no opportunity to collaborate with one another or discuss resources they received. Chapter III results indicated some participants felt they would benefit from resources on campus with learning communities established at Learning Academy possibly increasing not only participation but also resource implementation. Interview data in Chapter IV supports this result. For example, Nancy felt Learning Academy needed more support, and she felt obligated to provide that support but overwhelmed by the idea of support being her role. As she shared, "…there's not anyone I can lean on to learn from, so that's what I was hoping for form this [coaching]…. the conversation isn't happening and so I know so many ways that we can grow because I've seen it. I just can't lead it all the time" (Nancy_I1_022118). For future research, finding ways to help teachers engage in discussion and development with one another may prove to be an additional level of support beneficial for the proposed coaching model.

Results of this dissertation demonstrates the effectiveness of individualized coaching based upon teacher established goals. While I originally intended to determine specific DLI areas capable of being enhanced through coaching, I learned growth is less about the specific areas being coached (i.e., areas measured by the *DLIS*) and more about the potential teacher growth made possible through coaching. For example, the growth demonstrated through Camille's pre and post *DLIS* scores were inspiring, but her growth process is more important than the amount

of growth obtained as the process could potentially transfer to other aspects of her learning, and in turn, her students' learning. For this study, growth was largely obtained due to the influence of applied andragogy principles, Knowles (1978) work, while impactful, continually faces scrutiny for lacking empirical support. This dissertation provides empirical evidence to strengthen Knowles (1978) research, supporting the application of andragogy principles when developing professional development. Future research should focus on the potential transfer attained through coaching, highlighting if the coaching methods teachers participate in are replicated in their classrooms.

Conclusions

For the past twenty years, an emphasis has been placed on teacher technology preparation (i.e., digital literacy), with reports stating teacher education is "the single most important step" toward integrating technology into all levels of our education system (Groth, Dunlap, & Kidd, 2007; U.S. Department of Education, 1996; 2000). Many entities have dedicated projects and grants toward the improvement of teacher DL preparation (e.g., the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology program to date has spent over $275 million since 1999 (U.S. Department of Education, n.d.)). Even with the increased emphasis on teacher DL preparation, classroom DL instruction remains insufficient (Kalman & Guerrero, 2013). While many educators and researchers agree teacher DL preparation makes a unique contribution to learning, how to enhance teacher DL education remains contested. Additionally, due to the pace of digital evolution, it is naïve for us to assume that DL education can be fully covered in preservice education. The findings from this dissertation contribute to this ongoing conversation by providing methods for enhancing teachers' DL use and offering measures for recognizing areas of DLI and attributed DLI growth.

As indicated by this research, teachers often do not recognize how they use DL to learn, leaving them feeling unnecessarily inadequate when it comes to integrating DL into their classrooms. Lacking preparedness stems from limitations surrounding barriers related to perceived value associated with DL and experiences. If we can help teachers recognize how they personally use DL to learn, increasing their DLI, this identity will transfer to their classroom instruction. Such recognition breaks down barriers as teacher change their perception, leading to a change in their DL behavior as the value they associate with DL learning increases. Thus, as demonstrated through this research, increasing teachers' DLI will increase the quality and quantity of integrating DL into classroom instruction.

Educators estimate at least $1.5 billion (possibly ranging to $18 billion) is allocated for teacher PD each year, with states and districts collectively allocating additional local funds for PD (Wei, Darling-Hammond, & Adamson, 2010). Additionally, the federal government requires under-performing schools to allocate 10% of Title I funds to related PD (The National Staff Development Council, 2009). With obvious importance placed on effective PD, we must determine best methods and content for teacher education. Furthermore, with the changing needs of our 21st century world, DL should be a primary focus for PD efforts. As educators, it is imperative we develop students' DL skills and assisting teachers in recognizing their own DLI — with coaching-based PD methods — is one step to student development. These series of studies provide empirical support for the use of PD coaching for DLI, and thus one small step for that overall goal. Addressing this need will help to develop a generation of teachers better prepared to integrate DL into their classroom, thus enhancing their students' DL use.

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APPENDIX A

DLIS STRUCTURE COEFFICIENTS FOR PSYCHOMETRIC MODEL-OF-BEST FIT

(VERSION 1)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
I enjoy using technology to learn.	.011	.238	**.716**	.121	.015	.016	.182	.066	.002	-.009
I have a high interest in using technology to learn.	.080	.163	**.787**	.207	.015	-.043	.107	.082	.006	.040
I feel that learning with technology can be exciting.	.100	.171	**.727**	.062	.197	-.036	.063	-.054	-.022	.016
Using technology to learn can be stimulating.	.170	.275	**.573**	.193	.150	.095	.003	-.059	.150	-.023
Learning with technology is an important part of my life.	.157	.141	**.530**	.117	-.323	.158	.201	.107	-.001	.158
I use technology to learn frequently.	.186	.140	**.507**	.037	-.122	.206	-.039	.130	.281	-.099
I have a wide variety (or breadth) of interest in technology for learning.	.104	.124	**.763**	-.029	.065	.102	-.008	.013	.125	.165
I like to use technology for many different things.	.157	.128	**.523**	.020	.184	.355	.019	-.176	.125	.135
I use technology	.126	.242	**.418**	.111	-.222	.325	-.068	.193	.326	-.018

extensively to learn about certain topics.										
I enjoy using technology to learn a lot about something that interests me.	.130	.150	**.519**	.029	.048	.445	.016	.155	.022	.108
I feel I use technology for valuable reasons.	.209	.015	.169	.159	.105	.067	.116	.022	**.686**	.063
One of the reasons I use technology is for pleasure.	-.026	.198	.049	.017	.467	**.539**	.012	-.116	-.123	.032
One of the reasons I use technology is to learn more about things that interest me.	.281	.160	.138	.122	.026	**.645**	.094	.138	.105	.053
One of the reasons I use technology is to gain new knowledge.	.197	.191	.192	.294	.023	**.636**	.044	.147	.121	-.145
One of the reasons I use technology is to improve my understanding of life.	.266	.073	.114	**.669**	-.004	.349	-.050	.203	.096	.168
One of the reasons I use technology is to understand others better.	.321	.010	.055	**.760**	.004	.121	.122	-.008	.075	.095
One of the reasons I use technology is to understand myself better.	.199	.052	.143	**.800**	-.089	.048	.058	.008	.148	.153
I try to actively engage myself with the	.173	.154	.331	**.555**	.126	.064	-.020	.042	.206	-.150

technology I am using.										
I use technology with a purpose.	.176	.193	.187	.296	.164	.081	.020	.167	**.633**	-.130
I use technology proficiently.	.095	**.641**	.192	.048	.023	.047	.074	.029	.300	-.103
I understand most of the technology I use.	.047	**.713**	.104	.080	.322	.037	.074	-.004	-.096	-.155
When I use technology, I feel like I get a good grasp of the literal meaning being presented.	.186	**.588**	.317	.298	.178	-.059	.032	.095	.023	.010
I am comfortable with my technological ability.	.138	**.753**	.208	.130	.225	.011	.016	-.041	-.137	-.024
I feel like I have the ability to see implied meaning when using technology to learn.	.237	**.507**	.344	.435	.096	-.064	-.075	.254	.028	-.115
I don't mind demonstrating technology I use for others.	.152	**.665**	.138	.029	-.081	.040	-.034	.061	.090	.217
I feel like I use technology efficiently.	.090	**.770**	.172	.042	-.045	.046	.118	.078	.194	-.157
I feel like I can figure out how to use unfamiliar technology.	-.004	**.738**	.067	-.048	.018	.105	.047	.089	-.086	.164
I use technology to learn fluently.	.181	**.673**	.179	.025	-.010	.196	.037	.123	.115	.132

If my technological abilities were assessed, I would show good basic technological ability.	.130	**.726**	.102	-.047	.074	.251	.140	.037	.047	.026
Technology helps me make decisions about things.	.082	.100	.025	-.066	-.083	-.074	**.507**	-.200	.305	-.130
When I evaluate the main idea of what I learn while using technology, I look for supporting points.	-.023	.053	.169	.126	.102	-.098	**.652**	.091	-.154	-.176
When I am using technology, I often recognize ideas that may have personal or societal value.	.067	.079	-.021	.129	.082	.083	**.693**	.108	.179	.093
I construct new ideas from what I learn while using technology.	.172	.121	.186	-.051	-.052	.251	**.606**	-.005	-.103	.117
I use technology to learn intellectually challenging material.	.152	.171	.028	.036	.090	.098	.046	**.682**	.060	.057
I enjoy using technology to learn that goes beyond simple understanding.	.097	.096	.189	.019	**.617**	.208	.072	.245	-.018	.025

I like to use technology to learn things that make me think.	.133	.076	.042	.080	**.512**	.115	.075	.371	.052	.058
There are rich ideas in the material I learn using technology.	.208	.278	.123	-.067	**.511**	-.131	.155	-.021	.065	.290
I enjoy using technology to learn about things that stimulate my mind.	.148	.093	-.037	.029	**.575**	-.057	-.133	.136	.355	.057
I often use technology to learn concepts that are relatively difficult.	.103	.081	.064	.089	.193	.037	.016	**.744**	.054	-.015
I enjoy using technology to help me better understand other people.	.122	.040	.133	**.425**	.127	-.104	.234	.060	-.055	.416
I often use technology to broaden my understanding of the world.	-.065	.041	-.025	.210	-.005	.062	-.118	-.070	-.102	**.657**
I enjoy using technology to learn things I didn't know before.	.123	.007	.282	-.028	.196	.001	.015	.135	.105	**.628**
Technology often helps me change my perspective about things.	**.521**	.024	.291	.181	.098	.210	.059	.128	-.090	-.102
Technology often makes me want to make personal changes in my life.	**.716**	.188	.137	.111	.118	.121	-.016	-.078	-.026	-.194

When I learn something valuable from credible sources using technology, I usually apply it to the actions in my life.	**.624**	.095	.158	-.038	.031	.070	-.075	.308	.143	-.07
Learning with technology can transform my actions.	**.750**	.127	.184	.197	-.015	-.035	.085	.235	-.047	-.040
Learning with technology can transform my thinking.	**.553**	.134	.369	.198	.018	-.011	.285	.235	-.010	-.013
Learning with technology can transform my values.	**.747**	.115	.000	.131	-.018	.011	.123	.083	.048	.188
I can recall instances in which I have been personally transformed from things I learned using technology.	**.651**	.071	.055	.113	-.026	.050	-.061	.135	.258	.132
Technology makes me carefully consider changes I should make in my life.	**.729**	.151	.086	.069	.206	.103	-.006	-.004	.261	.097
Technology often causes me to be personally reflective.	**.693**	.130	.085	.093	.203	.178	.050	-.147	.179	.071
Some of my character is shaped by what I learn using technology.	**.672**	.086	.003	.380	.035	.088	.205	-.028	-.031	.037

APPENDIX B

DLIS FINAL MODEL FACTORS (VERSION 1)

Item #	Item	Factor
A1	I enjoy using technology to learn.	Attitude
A2	I have a high interest in using technology to learn.	Attitude
A3	I feel that learning with technology can be exciting.	Attitude
A4	Using technology to learn can be stimulating.	Attitude
A5	Learning with technology is an important part of my life.	Attitude
A6	I use technology to learn frequently.	Attitude
A7	I have a wide variety (or breadth) of interest in technology for learning.	Attitude
A8	I like to use technology for many different things.	Attitude
A9	I use technology extensively to learn about certain topics.	Attitude
A10	I enjoy using technology to learn a lot about something that interests me.	Attitude
B1	I feel I use technology for valuable reasons.	Mindset
B2	One of the reasons I use technology is for pleasure.	Importance
B3	One of the reasons I use technology is to learn more about things that interest me.	Importance
B4	One of the reasons I use technology is to gain new knowledge.	Importance
B5	One of the reasons I use technology is to improve my understanding of life.	Goals
B6	One of the reasons I use technology is to understand others better.	Goals
B7	One of the reasons I use technology is to understand myself better.	Goals
B8	I try to actively engage myself with the technology I am using.	Goals
B9	I use technology with a purpose.	Mindset
C1	I use technology proficiently.	Efficacy
C2	I understand most of the technology I use.	Efficacy
C3	When I use technology, I feel like I get a good grasp of the literal meaning being presented.	Efficacy
C4	I am comfortable with my technological ability.	Efficacy
C5	I feel like I have the ability to see implied meaning when using technology to learn.	Efficacy

C6	I don't mind demonstrating technology I use for others.	Efficacy
C7	I feel like I use technology efficiently.	Efficacy
C8	I feel like I can figure out how to use unfamiliar technology.	Efficacy
C9	I use technology to learn fluently.	Efficacy
C10	If my technological abilities were assessed, I would show good basic technological ability.	Efficacy
D4	Technology helps me make decisions about things.	Self-Regulated Learning
D8	When I evaluate the main idea of what I learn while using technology, I look for supporting points.	Self-Regulated Learning
D9	When I am using technology, I often recognize ideas that may have personal or societal value.	Self-Regulated Learning
D10	I construct new ideas from what I learn while using technology.	Self-Regulated Learning
E1	I use technology to learn intellectually challenging material.	Challenge
E2	I enjoy using technology to learn that goes beyond simple understanding.	Knowledge Achievement
E3	I like to use technology to learn things that make me think.	Knowledge Achievement
E4	There are rich ideas in the material I learn using technology.	Knowledge Achievement
E5	I enjoy using technology to learn about things that stimulate my mind.	Knowledge Achievement
E6	I often use technology to learn concepts that are relatively difficult.	Challenge
E7	I enjoy using technology to help me better understand other people.	Curiosity
E8	I often use technology to broaden my understanding of the world.	Curiosity
E10	I enjoy using technology to learn things I didn't know before.	Curiosity
F1	Technology often helps me change my perspective about things.	Knowledge Sources
F2	Technology often makes me want to make personal changes in my life.	Knowledge Sources
F3	When I learn something valuable from credible sources using technology, I usually apply it to the actions in my life.	Knowledge Sources

F4	Learning with technology can transform my actions.	Knowledge Sources
F5	Learning with technology can transform my thinking.	Knowledge Sources
F6	Learning with technology can transform my values.	Knowledge Sources
F7	I can recall instances in which I have been personally transformed from things I learned using technology.	Knowledge Sources
F8	Technology makes me carefully consider changes I should make in my life.	Knowledge Sources
F9	Technology often causes me to be personally reflective.	Knowledge Sources
F10	Some of my character is shaped by what I learn using technology.	Knowledge Sources

APPENDIX C

DLIS STRUCTURE COEFFICIENTS FOR PSYCHOMETRIC MODEL-OF-BEST-FIT

(VERSION 2)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
I enjoy using technology to learn.	-.111	.082	**.717**	.241	.211	-.072	.018	.011	-.254
I have a high interest in using technology to learn.	-.091	.173	**.737**	.204	.197	-.066	.009	-.025	-.288
I feel that learning with technology can be exciting.	-.146	.126	**.627**	.161	.199	-.007	-.157	-.051	-.218
Using technology to learn can be stimulating.	-.152	.206	**.619**	.233	.197	.003	-.256	-.005	-.043
Learning with technology is an important part of my life.	-.163	.255	**.617**	.156	.155	-.002	.133	-.136	.089
I use technology to learn frequently.	-.023	.178	**.611**	.185	.157	-.137	-.032	.043	.248
I am interested in many aspects of using technology for learning.	-.119	.138	**.753**	.155	.141	.006	-.153	-.099	-.069
I like to use technology for many different things.	.118	.177	**.618**	.172	.161	.018	-.115	.005	.166

I use technology extensively to learn about certain topics.	.022	.237	**.582**	.256	.128	-.132	.075	.049	.316
I enjoy using technology to learn a lot about something that interests me.	.154	.127	**.605**	.211	.221	-.181	.063	-.018	.263
I use technology for valuable reasons.	**.962**	-.093	-.063	-.087	-.001	.054	.004	.013	.036
I use technology for pleasure.	**.953**	-.153	-.090	-.072	-.006	.045	.001	.015	.001
I use technology to learn more about things that interest me.	**.970**	-.107	-.054	-.077	.010	.041	.016	.013	.039
I use technology to gain new knowledge.	**.974**	-.109	-.046	-.079	.012	.035	.017	.020	.032
I use technology to improve my understanding of life.	**.961**	-.041	-.025	-.074	-.014	-.001	.029	-.049	.032
I use technology to understand others better.	**.956**	-.023	-.052	-.076	.012	.047	.041	-.026	-.001
I use technology to understand myself better.	**.934**	.001	-.035	-.059	-.017	.046	.085	-.094	-.026
I try to actively engage myself with the	**.965**	-.044	-.006	-.040	.010	.033	.015	.018	-.045

technology I am using.									
I use technology with a purpose.	**.966**	-.049	-.061	-.060	.004	.025	-.006	.033	-.020
I use many different types of technology.	**.953**	-.127	-.024	-.044	-.012	.080	.015	.026	-.009
I use technology proficiently.	.-.084	.193	.278	**.638**	.193	-.084	.001	.095	.082
I understand most of the technology I use.	-.028	.095	.085	**.752**	.090	-.140	-.108	.044	-.179
When I use technology, I feel like I get a good grasp of the literal meaning being presented.	-.056	.293	.317	**.596**	.132	-.121	-.056	-.067	-.281
I am comfortable with my technological ability.	-.063	.145	.203	**.795**	.089	-.072	-.079	-.030	-.178
I feel like I have the ability to see implied meaning when using technology to learn.	-.032	.279	.344	**.570**	.124	-.200	-.028	.043	-.201
I don’t mind demonstrating technology I use for others.	-.130	.207	.156	**.663**	.084	.002	-.075	-.132	.046
I feel like I use technology efficiently.	-.065	.156	.233	**.717**	.249	-.044	.000	.063	.105
I feel like I can figure out how to use	-.120	.081	.099	**.744**	.151	-.087	.013	-.091	.104

unfamiliar technology.									
I am fluent in using technology for learning purposes.	-.127	.237	.257	**.633**	.192	-.068	-.170	-.042	.198
If my technological abilities were assessed, I would show good basic technological ability.	-.078	.120	.185	**.670**	.279	-.068	-.220	.005	.216
When I use technology to learn, I often use background knowledge to understand new concepts.	-.118	.135	.324	.165	**.465**	-.188	-.024	.252	.196
Things I learn with technology makes me think of things I have never thought of before.	.055	.223	.186	.137	**.514**	.140	-.436	.141	.081
I often make decisions about things when I use technology to learn.	-.093	.188	.188	.207	**.487**	.061	-.307	.145	.012
I use technology to help me make decisions about things.	.009	.238	.080	.129	**.526**	.149	-.095	.054	-.049
When I use technology, I combine ideas I already have	.065	.186	.252	.180	**.598**	-.110	-.014	.039	.077

with ideas I learn to form new understandings.									
I question information I learn using technology.	-.066	.243	.254	.166	**.532**	-.103	.039	-.058	.227
I ask myself questions while I use technology to learn.	.082	.017	.201	.132	**.521**	.110	.121	-.069	-.026
I use technology to find supporting points to help me evaluate the main idea of what I learn.	-.024	.057	.117	.121	**.650**	-.149	.155	-.104	-.285
When I am using technology, I often recognize valuable ideas.	-.011	.137	.101	.145	**.664**	-.138	-.010	-.184	.060
When I use technology to learn, I construct new ideas.	.027	.251	.224	.145	**.588**	.063	-.053	-.042	-.069
I use technology to learn intellectually challenging material.	.091	-.132	-.046	-.115	-.024	**.688**	-.052	.062	-.059
I use technology to learn that goes beyond simple understanding.	.045	-.102	-.083	-.142	-.088	**.579**	.245	.062	.179
I use technology to learn things	.065	-.107	-.029	-.075	.017	**.551**	.294	.126	.165

that make me think.									
I use technology to learn rich material.	.047	-.123	-.032	-.145	-.087	.259	**.615**	.185	.223
I use technology to learn about things that stimulate my mind.	.021	-.101	-.029	-.028	-.117	**.476**	.476	-.007	-.083
I use technology to learn concepts that are relatively difficult.	.075	-.071	-.103	-.099	.005	**.739**	-.001	.043	-.153
I use technology to help me better understand other people.	-.002	-.194	-.046	-.045	-.181	.219	.001	**.626**	.071
I use technology to broaden my understanding of the world.	-.064	.015	.020	-.017	-.006	-.039	.089	**.789**	-.044
I gain knowledge by most technology I use.	.092	-.172	-.123	-.187	.061	.174	**.606**	.211	-.135
I use technology to learn things I didn't know before.	.062	-.019	-.217	-.013	.094	.265	.308	**.516`**	.014
Technology often helps me change my perspective about things.	-.056	**.604**	.276	.130	.136	-.116	-.039	-.025	-.006
Technology often makes	-.063	**.755**	.131	.194	.086	.016	-.045	.081	-.041

me want to make personal changes in my life.									
When I learn something valuable from credible sources using technology, I usually apply it to the actions in my life.	-.091	**.679**	.195	.140	.081	-.188	.004	.082	.011
Learning with technology can transform my actions.	-.054	**.799**	.168	.142	.186	-.065	-.025	.046	-.117
Learning with technology can transform my thinking.	-.030	**.657**	.295	.148	.303	-.122	-.025	.024	-.128
Learning with technology can transform my values.	-.053	**.778**	.000	.107	.117	-.039	-.075	-.107	.012
I can recall instances in which I have been personally transformed from things I learned using technology.	-.108	**.738**	.121	.102	.096	-.064	-.079	-.065	.063
Technology makes me carefully consider changes I should make in my life.	-.109	**.788**	.131	.146	.097	-.067	-.124	-.067	.115
Technology often causes be to be	-.070	**.730**	.152	.150	.127	-.027	-.175	-.057	.126

personally reflective.									
Some of my character is shaped by what I learn using technology.	-.099	**.779**	.064	.111	.145	-.050	.032	-.121	-.047

APPENDIX D

DLIS ITEMS FACTOR MODEL-OF-BEST-FIT

Item #	Item	Factor
A1	I enjoy using technology to learn.	Attitude
A2	I have a high interest in using technology to learn.	Attitude
A3	I feel that learning with technology can be exciting.	Attitude
A4	Using technology to learn can be stimulating.	Attitude
A5	Learning with technology is an important part of my life.	Attitude
A6	I use technology to learn frequently.	Attitude
A7	I am interested in many aspects of using technology for learning.	Attitude
A8	I like to use technology for many different things.	Attitude
A9	I use technology extensively to learn about certain topics.	Attitude
A10	I enjoy using technology to learn a lot about something that interests me.	Attitude
B1	I use technology for valuable reasons.	SRL
B2	I use technology for pleasure.	SRL
B3	I use technology to learn more about things that interest me.	SRL
B4	I use technology to gain new knowledge.	SRL
B5	I use technology to improve my understanding of life.	SRL
B6	I use technology to understand others better.	SRL
B7	I use technology to understand myself better.	SRL
B8	I try to actively engage myself with the technology I am using.	SRL
B9	I use technology with a purpose.	SRL
B10	I use many different types of technology.	SRL
C1	I use technology proficiently.	Efficacy
C2	I understand most of the technology I use.	Efficacy
C3	When I use technology, I feel like I get a good grasp of the literal meaning being presented.	Efficacy
C4	I am comfortable with my technological ability.	Efficacy
C5	I feel like I have the ability to see implied meaning when using technology to learn.	Efficacy
C6	I don’t mind demonstrating technology I use for others.	Efficacy
C7	I feel like I use technology efficiently.	Efficacy

C8	I feel like I can figure out how to use unfamiliar technology.	Efficacy
C9	I am fluent in using technology for learning purposes.	Efficacy
C10	If my technological abilities were assessed, I would show good basic technological ability.	Efficacy
D1	When I use technology to learn, I often use background knowledge to understand new concepts.	Knowledge Achievement
D2	Things I learn with technology makes me think of things I have never thought of before.	Knowledge Achievement
D3	I often make decisions about things when I use technology to learn.	Knowledge Achievement
D4	I use technology to help me make decisions about things.	Knowledge Achievement
D5	When I use technology, I combine ideas I already have with ideas I learn to form new understandings.	Knowledge Achievement
D6	I question information I learn using technology.	Knowledge Achievement
D7	I ask myself questions while I use technology to learn.	Knowledge Achievement
D8	I use technology to find supporting points to help me evaluate the main idea of what I learn.	Knowledge Achievement
D9	When I am using technology, I often recognize valuable ideas.	Knowledge Achievement
D10	When I use technology to learn, I construct new ideas.	Knowledge Achievement
E1	I use technology to learn intellectually challenging material.	Challenge
E2	I use technology to learn that goes beyond simple understanding.	Challenge
E3	I use technology to learn things that make me think.	Challenge
E4	I use technology to learn rich material.	Challenge
E5	I use technology to learn about things that stimulate my mind.	Challenge
E6	I use technology to learn concepts that are relatively difficult.	Challenge
E7	I use technology to help me better understand other people.	Challenge
E8	I use technology to broaden my understanding of the world.	Challenge
E9	I gain knowledge by most technology I use.	Challenge
E10	I use technology to learn things I didn't know before.	Challenge
F1	Technology often helps me change my perspective about things.	Knowledge Sources

F2	Technology often makes me want to make personal changes in my life.	Knowledge Sources
F3	When I learn something valuable from credible sources using technology, I usually apply it to the actions in my life.	Knowledge Sources
F4	Learning with technology can transform my actions.	Knowledge Sources
F5	Learning with technology can transform my thinking.	Knowledge Sources
F6	Learning with technology can transform my values.	Knowledge Sources
F7	I can recall instances in which I have been personally transformed from things I learned using technology.	Knowledge Sources
F8	Technology makes me carefully consider changes I should make in my life.	Knowledge Sources
F9	Technology often causes me to be personally reflective.	Knowledge Sources
F10	Some of my character is shaped by what I learn using technology.	Knowledge Sources

APPENDIX E

DLIS STRUCTURE COEFFICIENTS FOR PSYCHOMETRIC MODEL-OF-BEST-FIT

(VERSION 3)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
I enjoy using technology to learn.	-.127	.099	.261	**.707**	.112	-.026
I have a high interest in using technology to learn.	-.111	.184	.219	**.734**	.104	-.044
I feel that learning with technology can be exciting.	-.156	.148	.191	**.646**	.136	-.087
Using technology to learn can be stimulating.	-.167	.230	.268	**.597**	.132	-.091
Learning with technology is an important part of my life.	-.170	.259	.155	**.589**	.086	.027
I use technology to learn frequently.	-.040	.204	.227	**.579**	.078	-.050
I am interested in many aspects of using technology for learning.	-.132	.159	.179	**.719**	.078	-.093
I like to use technology for many different things.	.096	.204	.210	**.576**	.097	-.004
I use technology extensively to learn about certain topics.	.001	.254	.279	**.560**	.038	.008
I enjoy using technology to learn a lot about something that interests me.	.133	.161	.247	**.597**	.130	-.061
I use technology for valuable reasons.	**.967**	-.070	-.062	-.053	-.000	.028
I use technology for pleasure.	**.958**	-.132	-.046	-.081	-.002	.015
I use technology to learn more about things that interest me.	**.976**	-.083	-.051	-.042	.009	.024
I use technology to gain new knowledge.	**.980**	-.085	-.052	-.032	.009	.023
I use technology to improve my understanding of life.	**.962**	-.017	-.058	-.013	-.021	-.035

I use technology to understand others better.	**.957**	.001	-.060	-.040	.007	.021
I use technology to understand myself better.	**.933**	.020	-.058	-.024	-.025	.006
I try to actively engage myself with the technology I am using.	**.963**	-.021	-.015	.006	-.005	.019
I use technology with a purpose.	**.966**	-.024	-.031	-.052	.003	.009
I use many different types of technology.	**.954**	-.107	-.021	-.014	-.020	.059
I use technology proficiently.	.-.108	.211	**.637**	.285	.102	.032
I understand most of the technology I use.	-.056	.109	**.733**	.090	.032	-.114
When I use technology, I feel like I get a good grasp of the literal meaning being presented.	-.088	.298	**.580**	.315	.059	-.132
I am comfortable with my technological ability.	-.093	.154	**.778**	.197	.016	-.081
I feel like I have the ability to see implied meaning when using technology to learn.	-.067	.287	**.570**	.344	.035	-.118
I don't mind demonstrating technology I use for others.	-.150	.215	**.604**	.161	.046	-.067
I feel like I use technology efficiently.	-.087	.178	**.709**	.248	.161	.050
I feel like I can figure out how to use unfamiliar technology.	-.137	.100	**.691**	.121	.095	-.061
I am fluent in using technology for learning purposes.	-.149	.261	**.624**	.263	.129	-.097
If my technological abilities were assessed, I would show good basic technological ability.	-.098	.157	**.679**	.202	.219	-.093
When I use technology to learn, I often use background knowledge to understand new concepts.	-.123	.179	.243	.335	**.341**	.028
Things I learn with technology makes me think	.045	.269	.220	.216	**.448**	.013

of things I have never thought of before.						
I often make decisions about things when I use technology to learn.	-.098	.229	.272	.222	**.402**	.016
I use technology to help me make decisions about things.	.007	.261	.170	.137	**.427**	.120
When I use technology, I combine ideas I already have with ideas I learn to form new understandings.	.056	.232	.240	.309	**.495**	-.009
I question information I learn using technology.	-.068	.279	.206	.306	**.436**	-.020
I ask myself questions while I use technology to learn.	.085	.062	.151	.248	**.406**	.128
I use technology to find supporting points to help me evaluate the main idea of what I learn.	-.022	.102	.158	.199	**.530**	-.047
When I am using technology, I often recognize valuable ideas.	-.009	.189	.187	.184	**.577**	-.127
When I use technology to learn, I construct new ideas.	.021	.285	.190	.276	**.486**	.044
I use technology to learn intellectually challenging material.	.110	-.143	-.145	-.077	.015	**.438**
I use technology to learn that goes beyond simple understanding.	.071	-.130	-.193	-.104	-.104	**.504**
I use technology to learn things that make me think.	.088	-.125	-.119	-.042	.015	**.539**
I use technology to learn rich material.	.068	-.155	-.189	-.040	-.105	**.516**
I use technology to learn about things that stimulate my mind.	.047	-.127	-.175	-.030	.049	**.496**
I use technology to learn concepts that are relatively difficult.	.096	-.091	-.140	-.124	.038	**.498**

I use technology to help me better understand other people.	.003	-.202	-.027	-.082	-.173	**.392**
I use technology to broaden my understanding of the world.	-.069	-.002	.039	.012	-.059	**.323**
I gain knowledge by most technology I use.	.109	-.194	-.214	-.100	.026	**.460**
I use technology to learn things I didn't know before.	.070	-.044	-.020	-.178	.038	**.517**
Technology often helps me change my perspective about things.	-.081	**.587**	.152	.274	.071	-.084
Technology often makes me want to make personal changes in my life.	-.120	**.650**	.163	.199	.101	-.067
When I learn something valuable from credible sources using technology, I usually apply it to the actions in my life.	-.082	**.795**	.157	.175	.109	-.105
Learning with technology can transform my actions.	-.056	**.660**	.180	.314	.218	-.054
Learning with technology can transform my thinking.	-.076	**.756**	.106	.012	.080	-.085
Learning with technology can transform my values.	-.013	**.709**	.112	.126	.051	-.082
I can recall instances in which I have been personally transformed from things I learned using technology.	-.134	**.784**	.154	.129	.041	-.097
Technology makes me carefully consider changes I should make in my life.	-.094	**.723**	.166	.152	.077	-.087
Technology often causes be to be personally reflective.	-.120	**.759**	.103	.075	.095	-.049
Some of my character is shaped by what I learn using technology.	-.099	**.779**	.064	.111	.145	-.050

APPENDIX F

DLIS VERSION 3 DESCRIPTIVE STATISTICS

Item	Mean (SD)
A1	1.85 (1.11)
A2	1.98 (1.19)
A3	1.59 (.99)
A4	1.71 (1.06)
A5	2.03 (1.22)
A6	1.67 (1.04)
A7	1.92 (1.17)
A8	1.58 (1.02)
A9	1.94 (1.17)
A10	1.45 (.90)
B1	3.81 (2.41)
B2	3.45 (2.49)
B3	3.51 (2.46)
B4	3.55 (2.46)
B5	3.94 (2.38)
B6	4.02 (2.35)
B7	4.29 (2.26)
B8	4.01 (2.36)
B9	3.87 (2.37)
B10	3.78 (2.28)
C1	1.74 (.68)
C2	1.64 (.79)
C3	1.74 (.86)
C4	1.72 (.88)
C5	1.77 (.83)
C6	1.72 (.94)
C7	1.66 (.75)
C8	1.93 (1.00)
C9	1.91 (.92)
C10	1.68 (.80)
D1	3.46 (.64)
D2	3.50 (.72)
D3	3.63 (.80)
D4	3.52 (.86)
D5	3.46 (.66)
D6	3.63 (.78)
D7	3.58 (.92)
D8	3.50 (.88)

D9	3.50 (.75)
D10	3.56 (.75)
E1	3.99 (1.18)
E2	3.94 (1.21
E3	4.08 (1.15)
E4	3.98 (1.26)
E5	4.06 (1.10)
E6	3.97 (1.19)
E7	3.87 (1.34)
E8	4.17 (.93)
E9	3.97 (1.26)
E10	4.14 (.84)
F1	1.79 (.82)
F2	2.05 (1.03)
F3	1.90 (.85)
F4	1.94 (.90)
F5	1.72 (.76)
F6	2.37 (1.20)
F7	2.10 (1.02)
F8	2.10 (1.00)
F9	2.00 (1.01)
F10	2.12 (1.06)

APPENDIX G

DLIS GOAL SETTING SHEET

Digital Learning Identity Survey					
	Section Description	Pre-Score	Goals	Action Items to Achieve Goals	Post Score
Section A: Attitudes Regarding Technology	This section measures an individual's perception of the importance of technology for learning purposes.				
Section B: Self-Regulated Technological Learning	This section measures an individual's ability to regulate and direct their own learning regarding technology.				
Section C: Technological Efficacy	This section measures perceptions of ability to use technology for higher purposes of learning successfully.				
Section D: Technological Knowledge Achievement	This section measures types of knowledge that is acquired through learning with technology.				
Section E: Kinds of Technological Learning Resources	This section measures an individual's preference for using technology to learn challenging material.				
Section F: Sources of Technological Knowledge	This section measures the amount and type of technology individuals use for higher purposes of learning.				

	Section Description	Areas to Grow/Strengthen
Section A: Attitudes Regarding Technology	This section measures an individual's perception of the importance of technology for learning purposes.	Choose this section if you want to change your attitude regarding using technology for higher purposes of learning.
Section B: Self-Regulated Technological Learning	This section measures an individual's ability to regulate and direct their own learning regarding technology.	Choose this section if you want to learn ways to regulate and direct and your own learning with technology.
Section C: Technological Efficacy	This section measures perceptions of ability to use technology for higher purposes of learning successfully.	Choose this section if you want to increase your confidence in using technology for higher purposes of learning.
Section D: Technological Knowledge Achievement	This section measures types of knowledge that is acquired through learning with technology.	Choose this section if you want to better understand how technology can increase learning.
Section E: Kinds of Technological Learning Resources	This section measures an individual's preference for using technology to learn challenging material.	Choose this section if you want to learn more about using technology to learn challenging material.
Section F: Sources of Technological Knowledge	This section measures the amount and type of technology individuals use for higher purposes of learning.	Choose this section to increase your tool box regarding technological resources to use for learning.

APPENDIX H

SAMPLE INTERVENTION SCHEDULE

Month	Week	DLIS Survey	Goal Setting	Lesson Plans	Weekly Check-in	Resources	Interviews	Focus Group
January 2018	1/8-1/14							
	1/15-1/21							
	1/22-1/28							
	1/29-2/4							
February 2018	1/8-1/14							
	2/12-2/18							
	2/19-2/25							
	2/26-3/4							
March 2018	3/5-3/11							
	3/12-3/18							
	3/19-3/25							
	3/26-4/1							
April 2018	4/2-4/8							
	4/9-4/15							
	4/16-4/22							
	4/23-4/30							
May 2018	5/1-5/6							
	5/7-5/13							
	5/14-5/20							
	5/21-5/27							
	5/28-6/3							
June 2018	6/4-6/10							
	6/11-6/17							
	6/18-6/24							
	6/25-7/1							
July 2018	7/2-7/8							
	7/9-7/15							
	7/16-7/22							
	7/23-7/29							
August 2018	7/30-8/5							
	8/6-8/12							

APPENDIX I

PROFESSIONAL DEVELOPMENT TRACKING EXAMPLE

Participant	PD 6 - more from last week or activity (2/19)	PD 7 - learn something new (2/26)	PD 8 (3/5)	PD 9 - Spring Break log (3/12)	PD 10 (3/19)
Patrick	reflection/catch up	2-math vid connections to humanities	Lifelong learning – follow up on accountability	check in ideas on accountability, tracking	Michael Wesch vid, collaborate, and DL pp - sent encouragement
Nancy	with comments about giving her more of what she needs	1-math vid with English connection	Lifelong learning – follow up with analyzing sources	NewsELA, tracking	Coggle, DL in practice, reflection on engagement
Jane	reflection/catch up	3-DL vid (thoughts follow-up)	Lifelong learning – follow up with digital citizenship	Spanish resources/ connection, tracking	text vs. multimodal, podcast – ask about Spanish resources
Erin	with resources for group evaluation	2-math vid, follow up with links to ELA	Lifelong learning – follow up with accountability	twitter. tracking	Michael Wesch vid, collaborate, and DL pp
Camille	with resources for scaffolding so students will take risks	1-math vid/reflect on learning	Lifelong learning – follow up with taking risks (for herself)	Hyperdocs, tracking	text vs. multimodal, podcast – resources for source checking

APPENDIX J

PROFESSIONAL DEVELOPMENT VIDEO RESOURCES

Topic	Video Link
Goal Setting	https://goo.gl/YsEmRp
What is Technology?	https://goo.gl/Nq7QPT
Learning Something New	https://goo.gl/sBgxEQ
Mindset List	https://goo.gl/BVAgDE

APPENDIX K

EXAMPLE REFLECTION EMAIL

Wendi Zimmer <wendinichole@gmail.com> Feb 19

to [redacted]

Good Morning, [redacted] and Happy President's Day! I hope you have something wonderful planned for your day off or are getting some much-deserved rest.

I wanted to check in to see how your STEAM project was going and see if I could do anything to help. I am sure it is fantastic. You mentioned in your check-in form that you were mindful of the time feedback on the projects would take and I agree that this is one of the most beneficial pieces of your project.

You may choose to look over some of the math resources I sent on Saturday, but if not (or if you want more)...

Choose one or more of the options below to reflect on this week. With all weekly resources, what you do with them is up to you. You are always welcome to write something down and upload it to our shared google drive, or you can just reflect in your own mind and write nothing down. Do whatever works best and is most beneficial for you. :)

Choices for this week:

1. Look back over your resources from last week's email and complete one you possibly did not have time to complete or review some resources we have already discussed.

2. In 1938, E. B. White (author of Charlotte's Web and many other books) wrote, "I believe television is going to be the test of the modern world. In this new opportunity to see beyond the range of our vision, we shall either discover an unbearable disturbance of the general peace or a saving radiance in the sky. We shall stand or fall by television — of that I am sure." We have moved beyond the traditional television explained by White and have progressed to a world of technology few could have imagined. Even with the advancements, I believe White's statement still stands. Repeat White's quote, replacing television with technology. Reflecting on learning with technology, what are your thoughts on White's quote? Will technology be the test of the modern world? What will cause it to be an unbearable disturbance of the general peace and what will create a saving radiance in the sky? Will we stand or fall by technology?

3. **Digital Learning Day is Thursday** (http://www.digitallearningday.org/). You are already doing amazing things with technology in your classroom. Share it with others.

Let me know if you need anything or if you are wanting tech ideas for your classroom. I am here to help any way I can.

Have a great week!

APPENDIX L

WEEKLY CHECK-IN FORM (OPTION 1)

Learning Through Reflection (LTR) Form

Giving yourself a chance to reflect on your learning is beneficial to understand your digital learning identity. Please respond to the following questions. This form is first and foremost for you – so write as little or as much as you find beneficial. Don't worry about complete sentences, bullets and phrases are completely appropriate.

Please enter your name.
Date
How are you today, right now? How has your week been?
What (if anything) are you learning regarding digital literacy?
Are there any resources you have found that have inspired your progress to this point or are there any resources you need to enhance your progress?
What challenges are you facing now?
Anything else?

APPENDIX M

WEEKLY CHECK-IN FORM (OPTION 2)

Joy Through Reflection (JTR) Form

Giving yourself a chance to reflect on your learning is beneficial to understand your digital learning identity. Please respond to the following questions. This form is first and foremost for you – so write as little or as much as you find beneficial. Don't worry about complete sentences, bullets and phrases are completely appropriate.

Please enter your name.
Date
How are you today, right now? How has your week been?
What mode of professional development did you choose this week? (check all that apply)
___ Activity ___ Video ___Research
What have you accomplished this week regarding digital literacy development (if anything)? What has resulted from these changes/accomplishments? (Remember nothing is insignificant. Celebrate your progress and successes!)
What (if anything) are you learning regarding digital literacy?
What are 1-2 digital literacy based goals you have this week?
Anything else?

APPENDIX N

WEEKLY CHECK-IN FORM (OPTION 3)

Celebrating Accomplishments (CA) Form

Giving yourself a chance to reflect on your learning is beneficial to understand your digital learning identity. Please respond to the following questions. This form is first and foremost for you – so write as little or as much as you find beneficial. Don't worry about complete sentences, bullets and phrases are completely appropriate.

Please enter your name.
Date
How are you today, right now? How has your week been?
What (if any) digital literacy related professional development opportunities have you participated in this week?
What have you accomplished this week regarding digital literacy development? How have you changed (if at all)? What has resulted from these changes/accomplishments? (Remember nothing is insignificant. Celebrate your process and successes!)
Why were you able to get these accomplishments done?
What didn't you get done, although you had intended to? Why didn't you get it done? This is not a time to feel bad, just reflect on what inhibited your intentions.
What are 1-2 digital literacy based goals you have this week?
Anything else?

APPENDIX O

FOCUS GROUP QUESTIONS

1. Do you think digital literacy should be integrated into school curriculum? Why or why not?
2. Before this study, what influenced your integration of digital literacy into your classroom?
3. When you try something new in your classroom, what motivates you to make this change?
4. What did you think about the learning experience?
5. How did the professional development you received impact your digital learning identity? (provide examples)
6. What aspects of the professional development were most influential?
7. How has changes in your digital learning identity transferred to your classroom? (provide examples)
8. What benefits are there to students knowing their own their digital learning identity?

APPENDIX P

ITEM SCORE AVERAGES

	Item	Pre Average	Post Average	D	Z	p
Attitude	I enjoy using technology to learn.	4.40	4.40	0.00	0.000	1.000
	I have a high interest in using technology to learn.	4.50	4.30	-0.20	.816	.414
	I feel that learning with technology can be exciting.	4.40	4.60	0.20	1.414	.157
	Using technology to learn can be stimulating.	4.30	4.50	0.20	1.414	.157
	Learning with technology is an important part of my life.	3.80	4.30	0.50	1.518	.129
	I use technology to learn frequently.	4.30	4.60	0.30	1.732	.083
	I am interested in many aspects of using technology for learning.	4.10	4.30	0.20	1.000	.317
	I like to use technology for many different things.	4.20	4.60	0.40	2.000	*.046**
	I use technology extensively to learn about certain topics.	3.90	4.30	0.40	1.081	.279
	I enjoy using technology to learn a lot about something that interests me.	4.80	4.60	-0.20	1.414	.157
Self-Regulated Learning	I use technology for valuable reasons.	4.30	4.40	0.10	.447	.655
	I use technology for pleasure.	4.60	4.50	-0.10	.378	.705
	I use technology to learn more about things that interest me.	4.70	4.60	-0.10	.447	.655
	I use technology to gain new knowledge.	4.20	4.50	0.30	1.342	.180
	I use technology to improve my understanding of life.	3.70	4.10	0.40	1.414	.157

	I use technology to understand others better.	3.60	3.90	0.30	.134	.257
	I use technology to understand myself better.	3.50	3.90	0.40	1.633	.102
	I try to actively engage myself with the technology I am using.	3.80	4.30	0.50	1.508	.132
	I use technology with a purpose.	4.00	4.60	0.60	2.121	*.034**
	I use many different types of technology.	3.90	4.60	0.70	2.333	*.020**
Efficacy	I use technology proficiently.	4.00	4.40	0.40	1.000	.317
	I understand most of the technology I use.	4.30	4.00	-0.30	1.134	.257
	When I use technology, I feel like I get a good grasp of the literal meaning being presented.	4.40	4.20	-0.20	.707	.480
	I am comfortable with my technological ability.	4.50	4.50	0.00	.000	1.000
	I feel like I have the ability to see implied meaning when using technology to learn.	4.00	4.10	0.10	.378	.705
	I don't mind demonstrating technology I use for others.	4.40	4.30	-0.10	1.000	.317
	I feel like I use technology efficiently.	3.70	4.30	0.60	1.222	.222
	I feel like I can figure out how to use unfamiliar technology.	3.90	4.00	0.10	.378	.705
	I am fluent in using technology for learning purposes.	4.00	4.30	0.30	.632	.527
	If my technological abilities were assessed, I would show good basic technological ability.	4.30	4.30	0.00	.000	1.000
Knowledge	When I use technology to learn, I often use background knowledge to understand new concepts.	4.60	4.30	-0.30	1.134	.257
	Things I learn with technology makes me think of things I have never thought of before.	3.90	4.10	0.20	1.000	.317

	I often make decisions about things when I use technology to learn.	3.60	4.00	0.40	1.414	.157
	I use technology to help me make decisions about things.	4.00	4.00	0.00	.000	1.000
	When I use technology, I combine ideas I already have with ideas I learn to form new understandings.	4.30	4.60	0.30	1.732	.083
	I question information I learn using technology.	4.30	4.00	-0.30	1.134	.257
	I ask myself questions while I use technology to learn.	4.30	4.20	-0.10	.000	1.000
	I use technology to find supporting points to help me evaluate the main idea of what I learn.	3.90	4.00	0.10	.447	.655
	When I am using technology, I often recognize valuable ideas.	4.10	4.40	0.30	1.342	.180
	When I use technology to learn, I construct new ideas.	4.20	4.10	-0.10	.378	.705
Challenge	I use technology to learn intellectually challenging material.	4.00	4.50	0.50	1.890	.059
	I use technology to learn that goes beyond simple understanding.	4.10	4.40	0.30	1.342	.180
	I use technology to learn things that make me think.	3.90	4.30	0.40	2.000	*.046**
	I use technology to learn rich material.	3.90	4.30	0.40	2.000	*.046**
	I use technology to learn things that stimulate my mind.	4.10	4.30	0.20	1.000	.317
	I use technology to learn concepts that are relatively difficult.	3.90	4.30	0.40	1.414	.157
	I use technology to help me better understand other people.	3.40	3.80	0.40	1.134	.257
	I use technology to broaden my understanding of the world.	4.20	4.20	0.00	.000	1.000
	I gain knowledge by most technology I use.	3.90	4.20	0.30	1.342	.180

	I use technology to learn things I didn't know before.	4.20	4.30	0.10	.447	.655
Knowledge Sources	Technology often helps me change my perspective about things.	3.60	3.90	0.30	1.342	.180
	Technology often makes me want to make personal changes in my life.	2.80	3.80	1.00	2.456	*.014**
	When I learn something valuable from credible sources using technology, I usually apply it to the actions in my life.	3.60	3.90	0.30	1.000	.317
	Learning with technology can transform my actions.	3.70	3.90	0.20	1.000	.317
	Learning with technology can transform my thinking.	3.80	4.00	0.20	1.000	.317
	Learning with technology can transform my values.	2.80	3.40	0.60	1.387	.165
	I can recall instances in which I have been personally transformed from things I learned using technology.	3.20	3.60	0.40	1.414	.157
	Technology makes me carefully consider changes I should make in my life.	2.80	3.80	1.00	2.232	*.026**
	Technology often causes me to be personally reflective.	3.10	3.80	0.70	1.725	.084
	Some of my character is shaped by what I learn using technology.	2.70	3.70	1.00	2.428	*.015**
	Note. * Indicates significance at the .05 level.					

APPENDIX Q

INTERVIEW QUESTIONS

Beginning Interview

1. How is technology a part of your everyday life and what do you use it for?
2. When you look at the results from your digital learning identity survey, what are your thoughts?
3. When you try something new in your classroom, what inspires or motivates you to make this change?
4. Tell me about a time you integrated digital literacy in your classroom.
5. Can you envision a way it would help your students now? (provide examples)

Middle Interview

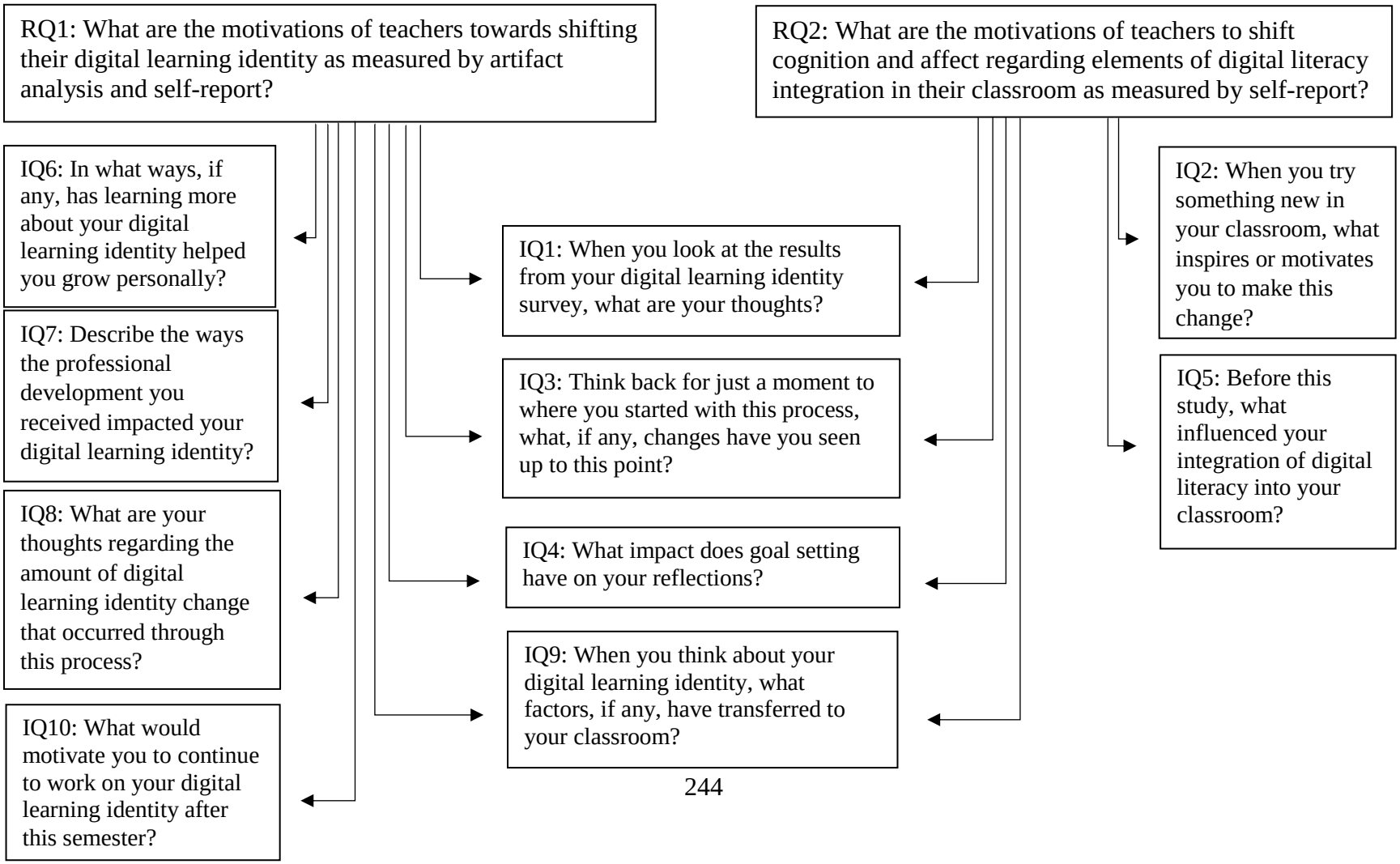
1. Think back for just a moment to where you started with this process, what, if any, changes have you seen up to this point?
2. Tell me about a digital literacy lesson you have implemented thus far.
3. When you hear the phrase digital literacy, what do you think?
4. What impact does goal setting have on your reflections?
5. Before this study, what influenced your integration of digital literacy into your classroom?

Final Interview

1. What did you think about this learning experience?
2. What do you feel was the most important part of this study? Why?
3. Describe the ways the professional development you received impacted your digital learning identity?
4. What are your thoughts regarding the amount of digital learning identity change that occurred through this process?
5. What would a typical day in your classroom look like?
6. When you think about your digital learning identity, what factors, if any, have transferred to your classroom?
7. What advice would you give students using digital literacy to learn?
8. What would motivate you to continue to work on your digital learning identity after this study?

APPENDIX R

RESEARCH QUESTIONS RELATED TO INTERVIEW QUESTIONS



APPENDIX S

EXAMPLE PROFESSIONAL LEARNING ACTIVITY

Erin Use of technology during a Spring Break Day

7:30 iphone alarm
7:45 Breakfast with [husband] watching youtubes on living room smart T.V. Watched a clip from the Daily show about proposal to arm teachers and watched two cooking videos about how to make hash and mushroom pasta
8:00 Checked fitbit to track sleep and steps--started stepping in front of our cooking videos to up my count
8:15 Read ovia app and what to expect website to read about [baby's] development as he reaches the 38 week mark today!!!
Checked my email on phone, breaking my rule of not looking at email until after journaling
8:28 Received a call from Molly Maids about yesterday's service and tried (and failed) to use a coupon that came in the mail--old media fail!!!
10:00 Listened to spotify playlist while getting ready
10:51 Texted Rebecca back about plans to walk tomorrow

All this on my personal laptop (everything above was on my phone)
11:00 Opened baby Target giftcard in the mail from [husband's] step sister and added the info to a google doc of [baby's] gifts, so I don't forget to text her or mail her a thank you note
Checked school email and deleted clutter--I'm an inbox zero kind of gal
Responded to a couple of emails about Maternity leave. Sending anchor docs of resources to people who are covering for me and answering follow-up questions.
Read your email about me getting on twitter and read the article that you shared. Super Helpful!!!!
Checked twitter. Bryan tweeted something at me and Morgan about whether we use grammarly. I love grammarly but am still uncomfortable tweeting so am waiting for Morgan to respond as I learn twitter protocol. Old millenial!!!!!
Followed NCTE--was reminded by reading the article
Read your email about this week's resources. I had read your running tech email last night, so I started this doc and tried to remember the timing of everything I've already used today. :)
1:30 Another youtube work break with [husband] (working from home today.) Watched a funny video and looked up the word "ostensibly" on my phone to make sure I had the right meaning correct.
Showed [husband] that [baby] is the size of a butternut squash according to my app.
We both received a group text from our neighbors asking if mosquito joe made a

difference in our yard
While [husband] texted back, I remembered that I'd received a mosquito bite and looked up effects of zika in late pregnancy on my phone--bad idea. I usually don't allow myself to google medical stuff.

1:53 Read this article that [administrator] emailed me and then asked if he thought these online summer courses would be worthwhile.
Got an email that Morgan had resolved comments I'd made on her grant proposal google doc. Sent her an email about the article and courses above because I know she's interested in this as well and thanked her again for the awesome grant she is writing to book love to (hopefully) get an awesome classroom library.

2:06 Submitted a google form to you about Learning through reflection-
Added this doc to my google drive folder for you

2:14 Emailed you this doc-this is so meta!
Got back to inbox zero!!!

2:16 Added another gift to my thank you notes google doc

2:28 Had [husband] take a picture of my pregnant belly and sent it to a group text to my family.

2:30 Called my dad. He's ecstatic because he just had eye surgery in both eyes which has gotten his vision back to 20/20. Life changing technology.

2:38 Texting family

4:00 Watched youtube videos on 38 week development and newborn care

4:28 Phone call with sister

4:58 Checked weather app

4:59 Texting friends about crawfish tonight

5:00 Yoga with Adriene Youtube prenatal yoga video

8:00 Checking google calendar for schedule tomorrow

9:00 Streaming netflix on roku

Things that I did throughout the whole day but forgot to track:

- Received step alerts from fitbit
- Checked fitbit step count throughout day on wrist and phone
- Added items to a digital checklist on my phone as I thought of them, some store items and some ideas for my 18 in 2018 goals list

APPENDIX T

DIGITAL LEARNING INTEGRATION MATRIX

		Consumption		Production					
		Knowledge (Research, Summarize, Classify, Duplicate, Identify, List, Recall)	Comprehension (Organize, Infer Describe, Explain, Discuss, Compare)	Application (Share, Edit, Demonstrate, Present, Teach, Interview)	Analysis (Report, Survey, Validate, Contrast, Determine, Differentiate)	Evaluation (Rank, Discuss, Conclude Hypothesize, Critique)	Creation (Program, Publish, Animate, Compose, Invent, Design)	Transformation (Change, Restructure, Alter, Act, Reorganize, Experience)	Notes
Aligned Elements	Technology Methods (What technology is used for)								
	Learning Objectives (Goal of instruction)								
	Instructional Strategies (Teaching methods)								
	Demonstrated Learning (What students learned)								

Additional Elements	Collaborative Learning (Learning in groups)								
	Transitional Methods (Combination of tech and traditional)								
	Differentiated Learning (Individualized)								
	Active Learning (Student involvement)								
	Assessment of Learning (Match assessment with objectives)								
Total:									

Specific Technology Used: _____

Is the technology taught?	Yes No
Is the technology used developmentally appropriate?	Yes No
Could the same lesson be taught without using technology?	Yes No
Is the learning authentic?	Yes No
Is the learning intentional?	Yes No